

NEIGHBORHOODS BY FOOT

A STUDY OF NEIGHBORHOOD WALKABILITY OVER TIME
CHARLOTTE, NORTH CAROLINA

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PART 1

INTRODUCTION

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A PLANNING FAILURE

The 1950s “American dream” of a secluded home in the suburbs, a wife and two children, and a family automobile to drive everywhere seems to have created some unintended consequences over sixty years later. Today, residents of the nation’s sprawling suburbs spend many of their waking hours in the car, whether in traffic on a work commute, or just driving to a store or restaurant. According to the most recent National Household Travel Survey from the United States Department of Transportation, the average American spends one hour traveling a total of 40 miles per day, usually alone. Furthermore, only eight percent of routine trips are made by walking, with merely two percent of work trips being on foot (Campoli, 2012). Simply put, the separation of land uses in the suburbs has made traveling without a car impossible.

What’s the result of all this driving? Americans have developed a reputation worldwide for being overweight and inactive. Health concerns have spurred various studies. One study co-authored by the Transportation Research Board and the Institute of Medicine found that 55 percent of the U.S. adult population is less active than recommended guidelines, and that approximately 25 percent report being inactive when not working. The same study reports that walking briskly for 30 minutes for at least five days a week reduces the risk of premature death and various diseases; improves psychological well-being; and helps to maintain a constant weight (Humphery, 2005). The built environment has a complex, but important relationship with physical activity, being an important factor in one’s decision to walk for both pleasure and transportation.

As time has passed, preferences have also changed against the secluded auto-centric suburbs. Researchers including Chris Leinberger believe that today’s large population of baby boomers will soon exchange their suburban homes where they once raised children for smaller homes in walkable locations with good access to public services. Further, the Millennial generation is shunning auto-centric suburbs in favor of urban cores, where 77 percent of them live now or plan to reside. They seek vibrant, walkable communities that boast economic, social, and recreational opportunities. Only half of first-time homebuyers say they are seeking drivable suburban homes (Leinberger, 2010). Such research findings offer hope for the future success of walkable environments.



THE BUILT ENVIRONMENT AND WALKING

As already mentioned, the built environment plays a key role in how residents choose to move throughout their environment, either via automobile, bicycle, or on foot. One study concluded that “the most important variable in predicting a change in walking is a change in attractiveness” meaning a well-maintained neighborhood with a variety of housing styles and large street trees (Handy & Mokhtarian, 2005). The same study also concluded that a change in accessibility was the most important variable in predicting changes in driving; however, attitudes and preferences also hold significant weight on choosing whether or not to drive. The study advised that increasing accessibility through mixed-use zoning, street connectivity ordinances, and infill development would be most effective in increasing the potential for walking instead of driving (Handy & Mokhtarian, 2005).

A more recent study concluded that the design and diversity elements of the built environment are the strongest predictors of walking trips. Specifically, intersection density was a stronger predictor of walking than street connectivity, and jobs-housing balance had more sway on walking than land use mix. The study also found that population density had a stronger association with walking than job density, and that a nearby transit stop may stimulate walking. They summarized stating that “Almost any development in a central location is likely to generate less automobile travel than the best-designed, compact, mixed-use development in a remote location” (Ewing & Cervero, 2010). The table below details their compilation of findings in relation to walkability.

WALKABILITY ELEMENT	VARIABLE	TOTAL STUDIES	WEIGHTED AVERAGE ELASTICITY OF WALKING
DENSITY	Household / Population	10	0.07
	Job Density	6	0.04
DIVERSITY	Land Use Mix	8	0.15
	Jobs-Housing Balance	4	0.19
	Distance to a store	5	0.25
DESIGN	Street Intersection Density	7	0.39
DESTINATION ACCESSIBILITY	Job within 1-mile	3	0.15
DISTANCE TO TRANSIT	Distance to transit stop	3	0.15

DEFINING CHARACTERISTICS

A compilation of research conducted over the past two decades indicates that there are five primary attributes of the built environment that affect travel behavior, specifically that replace vehicle miles traveled (VMT) with walking and transit use. These characteristics have been coined the “Five D’s”: diversity, density, design, distance to transit, and destination accessibility (Campoli, 2012). *Made for Walking* examines the built environments of twelve urban neighborhoods, offering practical methods to measure neighborhood walkability using the Five D’s (Campoli, 2012). I employ many of these methods today to five neighborhood case studies in the Charlotte, North Carolina region.

Smart growth supporters also value the six attributes of walkability in their initiatives for compact development. Smart Growth America offers six goals for smart growth, one being neighborhood livability. This goal states that “neighborhoods should be safe, convenient, attractive, and affordable for all people.” *The Smart Growth Manual*, written by advocates for smart growth and new urbanism, is a guide of practical techniques to implement and assess smart growth principles. The manual focuses on an array of elements within four areas: the region, the neighborhood, the street, and the building (Duany, Speck, & Lydon, 2010). Specific elements from the manual are included in this study to give greater depth into the application of the six attributes of walkability.

NEIGHBORHOOD WALKABILITY IN CHARLOTTE

The purpose of this research is to determine the overall walkability among neighborhoods of different eras by measuring multiple elements of their built environments in relationship to the “Five D’s.” The study examines three neighborhood designs: the streetcar suburb, the conventional suburb, and the traditional neighborhood development. Streetcar suburbs originated nearby city centers from the 1890s to the 1930s, being developed along a streetcar line that terminated at a community center. Conventional suburbs followed after World War II and continue today, featuring low-density residential subdivisions that are auto-centric and physically separated from other land uses. After decades of conventional suburbs, traditional neighborhood development (TND) brought back design elements from the streetcar suburbs during

the New Urbanism movement of the 1990s and 2000s. Today, both conventional suburbs and TND communities are under development in the United States. I attempt to differentiate these eras of neighborhood development by examining the built environments of existing neighborhoods that represent each development era.

Five neighborhoods within the Charlotte region have been selected as case studies. First, the Dilworth neighborhood is Charlotte's first streetcar suburb, being developed from the 1890s to 1910s. Second, Myers Park is an affluent streetcar suburb of Charlotte, developed from the 1910s to 1920s by famed landscape architect John Nolen. Third, McAlpine is a residential subdivision that was developed from the 1970s to 1990s in suburban South Charlotte. Fourth, Birkdale Village is a 2000s-era traditional neighborhood development located in Huntersville, North Carolina. Finally, Baxter Village is another 2000s-era traditional neighborhood development located in Fort Mill, South Carolina. These neighborhoods are described in detail later on in the study.

There have been few studies done to compare the walkability of built environments within neighborhoods of different eras. Further, there has not been a comparison among neighborhoods in the Charlotte region. This study serves to remind planners of the history and timeless value of the neighborhood unit in an era when suburban subdivisions dominate. There are critical elements of a neighborhood that encourage walkability that have been all but forgotten since World War II, when automobiles drastically changed the built environment.

New Urbanism claims to hark back to the original design of neighborhoods in order to reduce reliance on the automobile and to encourage walking or bicycling as an alternative. Results of this study will either validate or discredit claims of the New Urbanism movement. Historic neighborhood development principles have also regained strength through the introduction of the LEED for Neighborhood Development Rating System that assesses and rewards environmentally-superior green neighborhood development practices within the LEED rating system (United States Green Building Council, 2013). I will reference such standards to assess many of the characteristics of the five neighborhood case studies.

KEY FINDINGS AND CONCLUSIONS

Based on my research in Charlotte, I conclude that streetcar suburbs are often more walkable than traditional neighborhood developments. While both neighborhood types perform similarly in design, diversity, and density elements, the streetcar suburbs most often have a superior location near the center city, as compared to more suburban locations of traditional neighborhood developments. This central location leads to consistently higher performance in measures of destination accessibility and distance to transit. Location appears to be the prime weakness of the traditional neighborhood developments, while it is the prime strength of the streetcar suburbs. Regardless of location, both of these neighborhood types have far superior walkability to conventional suburbs, which fail to include features that pedestrians expect for a safe and comfortable journey through the neighborhood.

IMPLICATIONS

My findings support New Urbanist claims that the movement is reviving neighborhood development principles that were prominent prior to World War II and the inception of the conventional suburb. The TND communities feature similar land use, building, and streetscape designs to those of the streetcar suburbs. They also return civic and commercial uses to neighborhood centers, a practice that has been neglected since World War II. Finally, traditional neighborhood developments promote dense built environments with mixed-use structures, which have been outlawed by conventional zoning for decades. Unfortunately, the availability of large land tracts for development are often located in suburban locations. The result is a pedestrian-friendly neighborhood within an auto-centric surrounding environment.

Planners who wish to promote walkable environments should consider the neighborhood unit and the implementation of the "Five D's" into development standards. Municipalities may also want to streamline their approval process for walkable projects, such as TNDs and transit-oriented developments. The continuing development of conventional suburbs that lack walkability attributes will only exacerbate problems associated with our nation's auto-dependence.

PART 2

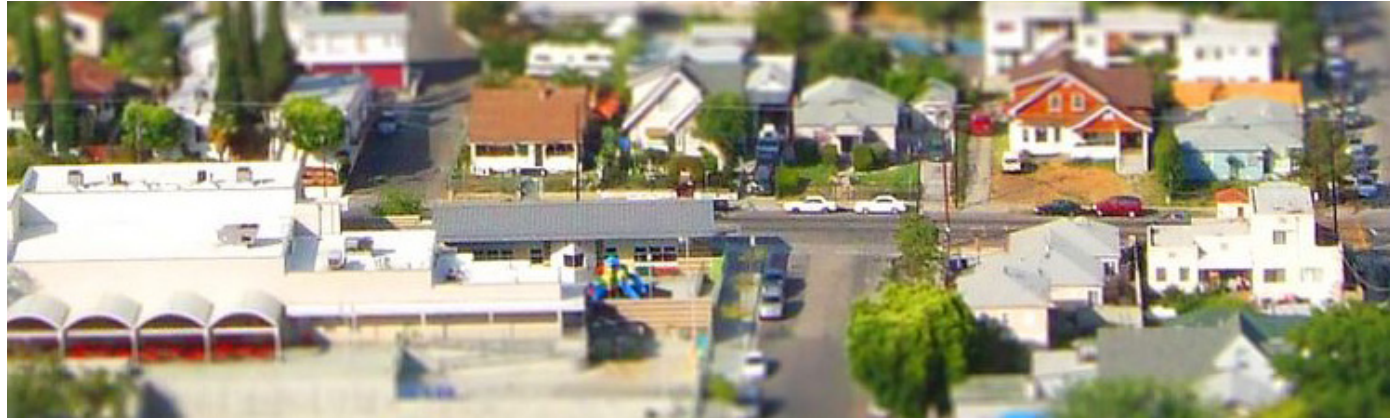
BACKGROUND RESEARCH

1. NEIGHBORHOOD MODELS

2. CHARLOTTE CASE STUDIES

1

Neighborhood Models



There have been three central models promoting complete neighborhood design that have influenced residential development in America over the 20th century: the Neighborhood Unit; the Garden City (the Radburn model); and New Urbanism. These models are fundamentally different to the piecemeal, residential-only subdivisions that rose to popularity after World War II. This section is devoted to discussing the contribution of each model to neighborhood development patterns. I will first discuss each model in detail and then I will introduce an innovative methodology used today for accrediting complete neighborhoods.

THE NEIGHBORHOOD UNIT

The neighborhood unit model generally shaped planning, design, and development decisions from 1912 to 1968. The concept promoted integrated development on a neighborhood scale that provided areas within the community for open space, institutions, and shops. Prior to this time, residential development was completed incrementally, leading to formless neighborhoods with inconveniently-placed land uses such as the school or corner store. Perry argued that the neighborhood should rather be treated “as a living organism, with different parts each performing a special function” (Perry, 1929).

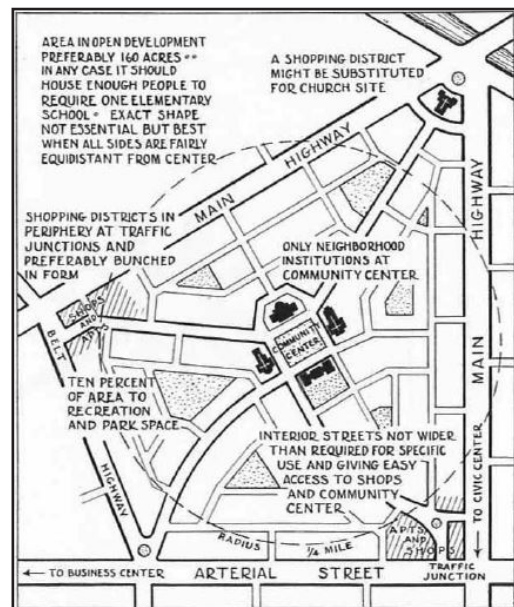
William Drummond first termed the neighborhood unit in an entry at the City Club of Chicago’s national design competition of 1912, which called for a design of a 160 acre parcel on Chicago’s south side that included parks, recreation centers, institutions, and better quality housing (Brody, 2013). Clarence Perry later formalized the concept in his monograph, *The Neighborhood Unit*, published in *Regional Survey of New York and its Environs* in 1929. In his monograph, Perry developed the following six neighborhood unit principles:

1. **Size:** A residential unit development should provide housing for that population for which one elementary school is ordinarily required, its actual area depending upon population density.
2. **Boundaries:** The unit should be bounded on all sides by arterial streets, sufficiently wide to facilitate its by-passing by all through traffic.
3. **Open Spaces:** A system of small parks and recreation spaces, planned to meet the needs of the particular neighborhood, should be provided.
4. **Institution Sites:** Sites for the school and other institutions having service spheres coinciding with the limits of the unit should be suit-

ably grouped about a central point, or common.

5. Local Shops: One or more shopping districts, adequate for the population to be served, should be laid out in the circumference of the unit, preferably at traffic junctions and adjacent to similar districts of adjoining neighborhoods.
6. Internal Street System: The unit should be provided with a special street system, each highway being proportioned to its probable traffic load, and the street net as a whole being designed to facilitate circulation within the unit and to discourage its use by through traffic.

As a visual model, Perry also created a neighborhood unit diagram, shown at the right, to display his principles. The diagram shows a 160-acre neighborhood designed to accommodate 5,000 to 6,000 people in homes on 4,000 square foot lots. The neighborhood includes a community center with areas for retail, institutional, and school sites, as well as for parks and recreation. Arterial highways bound the neighborhood, which contains an internal street system for direct circulation within the unit, but not through it (Perry, 1929). Perry's six principles and neighborhood diagram have had a lasting impression on neighborhood design since their introduction in 1929.



Source: Regional Plan Association, 1929

The President's Conference on Home Building and Home Ownership and the literature that followed from the Federal Housing Administration's Land Planning Division made the neighborhood unit federal policy in the 1930s. The policy's main purpose was "to encourage the improvement in housing standards and conditions" and "to provide a system of mutual mortgage insurance." The FHA argued that the standards and conditions of the neighborhood were just as important as those of

the home itself. After this time, the condition of the neighborhood was a strong consideration in the valuation of the home, and the resulting ability to insure its purchase. As a result of this pervasive policy, homebuilders were forced to adopt neighborhood planning standards rather than developing by the single lot (Brody, 2013).

The Community Builders Handbook, published in 1947 by the Community Builders Council of the Urban Land Institute, sought to plan and build enduring neighborhoods with stable home values. The Handbook included Perry's six neighborhood unit principles, yet strayed from his neighborhood diagram, adding curvilinear streets and making neighborhood boundaries less defined. The neighborhood unit continued to be prominent in the Handbook through 1968, albeit with building practices falling further away from Perry's original principles. Later editions of the Handbook mentioned the neighborhood unit as one of many development models, but not as a defining concept (Brody, 2013). After nearly 40 years of influence, Perry's model gave way to planning for low density, suburban development that required automobile transportation between each segregated land use.

THE GARDEN CITY

While the Neighborhood Unit advanced in America, the Garden City advanced in England, being first envisioned by Ebenezer Howard in 1902. Howard sought to create a self-contained community that combined the benefits of city and country life. The city would feature a town center located no more than $\frac{1}{2}$ mile from all residents. Furthermore, residential areas would have easy access to schools, shops, recreation, and civic facilities. Open spaces would be distributed throughout the community. Howard's vision also promoted collective ownership of land, and employment within the community, meaning no work commutes (Lee & Ahn, 2003). England's first garden city was Letchworth, which started development in 1904 under the guidance of Raymond Unwin and Barry Parker (Nolen, 1927).

In America, Clarence Stein of the City Housing Corporation envisioned Radburn to be the nation's Garden City, but it is known today as a failed development due to the Great Depression. Stein touted Radburn as a "town for a motor age" based on the following design concepts: su-

per-blocks integrated into a neighborhood unit; a hierarchical street system; a complete separation of cars and people using pedestrian paths and cul-de-sacs; interior parks forming a continuous system; houses facing pedestrian paths and service rooms facing streets. The figure to the right shows two super-blocks in Radburn, which apply the aforementioned design concepts to the neighborhood.



Source: Radburn Plan, 1928

Radburn was planned to cover one square mile when construction started in 1928; however, the Great Depression caused financial turmoil that led to the developer's bankruptcy in 1934. Today, Radburn covers 149 acres and includes local retail, a school, and recreation facilities, yet lacking industry and other components that were originally planned (Lee & Ahn, 2003). Despite an unrealized dream, Radburn residents enjoy walking on serene paths and parks uninterrupted by city streets (Schwartz, 1972). While hierarchical streets and cul-de-sacs are challenged by the planning community, walkability is one of the greatest takeaways from the Radburn model.

NEW URBANISM

New Urbanism promotes the resurgence of neighborhood planning principles from a bygone era (pre-WWII), with a focus on quality urban design. Andres Duany and Elizabeth Plater-Zyberk have led the movement since their creation of the Seaside community in Florida in 1981. New Urbanism advocates for "the restoration of existing urban centers

and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy" (Duany, Speck, & Lydon, 2010). New Urbanism advocates promote a design orientation to create attractive, compact, mixed-use communities that embed civic, institutional, and commercial activity nodes within neighborhoods and districts. They also support higher densities in locations that offer transit access, known as transit-oriented development, attempting to lessen a community's reliance on the automobile. Architecture, building form, and street design are all primary concerns of this movement (Lee & Ahn, 2003). Today, New Urbanism often takes the form of a master-planned greenfield development, termed a traditional neighborhood development (TND). Numerous TND communities have been developed across America within the past two decades. Only time will tell whether these communities will offer the sense of place and timeless value that many turn-of-the-century historic neighborhoods grant us today.

NEIGHBORHOOD CERTIFICATION

As America's population continues to grow, it is critical that future development is done in a way that enhances the quality of life for present and future residents. The U.S. Green Building Council, the Congress for New Urbanism, and the Natural Resources Defense Council came together in 2009 to develop a rating system for neighborhood planning based on the combined principles of smart growth, New Urbanism, and green building. The partnership created a standard for assessing and rewarding environmentally-superior green neighborhood development practices within the LEED Rating System. LEED for Neighborhood Development (LEED-ND) promotes practices that create harmony between the landscape and its buildings and infrastructure in a neighborhood, while also reflecting local and regional contexts. The goal of the certification is to promote better site selection, design, and construction quality of future neighborhoods (United States Green Building Council, 2013).

The Council defines a neighborhood as, "an area of dwellings, employment, retail, and civic places and their immediate environment that residents and/or employees identify with in terms of social and econom-

ic attitudes, lifestyles, and institutions” (United States Green Building Council, 2013). Qualifying areas range from two habitable buildings to 320-acre neighborhoods. The certification of existing (retrofit) and future neighborhoods is based on a set of prerequisites and performance standards based on the following five topics:

1. Smart location and linkage
2. Neighborhood pattern and design
3. Green infrastructure and buildings
4. Innovation and design process
5. Regional priority credit

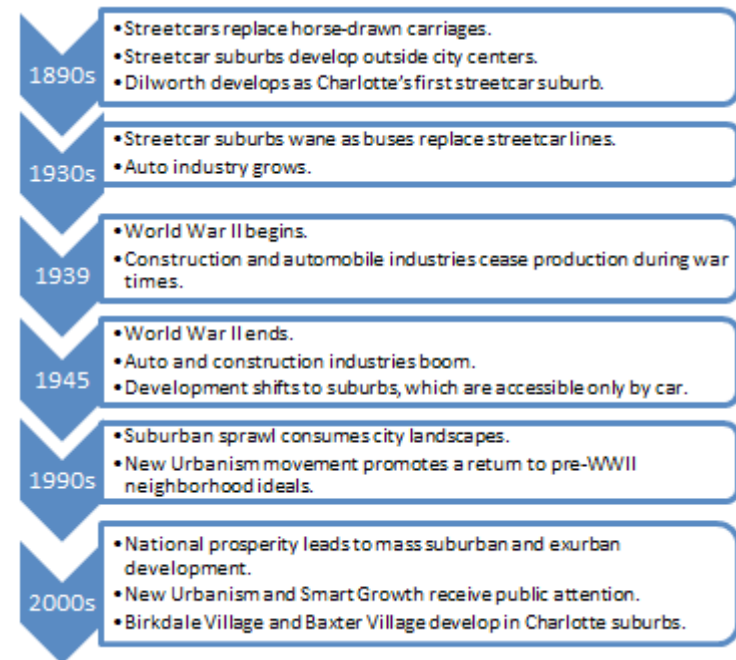
Together, these standards promote the development of compact, walkable, vibrant, mixed-use neighborhoods that are well-connected to nearby communities. After satisfying all prerequisites, the neighborhood is then assigned points based on how well it complies with the performance standards. The LEED-ND certification scale, based on 110 possible points, is shown below:

- Certified: 40-49 points
- Silver: 50-59 points
- Gold: 60-79 points
- Platinum: 80 points or more

The LEED-ND certification system represents a voluntary standard that can be applied as local governments see fit (United States Green Building Council, 2013). As each community is unique, these standards may be modified to local conditions. Although I will not employ these measures for the five neighborhood case studies, I recognize the value of these performance standards and will reference them, as applicable, throughout the analysis.

NEIGHBORHOOD DEVELOPMENT ERAS

I will focus on three neighborhood development eras that have impacted the nation’s built environment since the late 19th century. America’s first suburban neighborhoods developed just outside central cities along streetcar lines between the 1890s and 1930s, giving them the name “streetcar suburbs.” The advent of the automobile led to the mass development of auto-centric residential subdivisions, which have dominated residential development since the end of World War II. Most recently, traditional neighborhood development (TND) re-imagines pre-WWII neighborhood elements to create a more compact, complete community. I will now describe each neighborhood development era in detail.



STREETCAR SUBURBS

Streetcar suburbs were often the first unified developments within the city, as previous development had occurred incrementally based on the needs of the community (City of Salisbury, 2001). These neighborhoods boast connectedness, structure, walkability, and accessibility features that planners promote in today's residential development. Planners can learn much from these communities about the scale and arrangement of streets in relation to the built environment, public spaces, and activities that occur in these spaces (Southworth and Ben-Joseph, 2003). Perry's neighborhood unit concept would be most applicable during this time period, as planners were beginning to think on a larger scale than the individual lot. While the streetcar provided a means of transportation to work, shops, and entertainment, walking was the primary means of transportation. For this reason, compact neighborhoods and popular destinations were built at or near streetcar stations.

DEFINING CHARACTERISTICS

- Compact neighborhoods with small lots
- Convenient access to public transportation
- Destinations within walking distance
- Small neighborhood retail centers
- Pedestrian-oriented scale and architecture
- Grid street system with small blocks
- Connected streets to adjacent development
- Front porches overlooking modest setbacks
- Strong link between the front porch and the sidewalk
- Front yards without driveways; alley access only
- Sidewalks and street trees
- Community centers and parks

CONVENTIONAL SUBURBS

Conventional suburbs are highly influenced by the automobile and Euclidean zoning, creating an environment that is auto-centric and separated by land use. *Suburban Nation* outlines the five components of sprawl: housing subdivisions, shopping centers, office parks, civic institutions, and roadways (Duany, Plater-Zyberk, & Speck, 2000). Housing subdivisions consist of homogeneous residences, separated from shops and businesses, and residents of different income levels. Shopping centers and office parks are exclusively for shopping and work, respectively, and feature large parking lots between the street and the building. Civic institutions are large, unadorned buildings surrounded by parking and placed with no consideration to the community. Roadways connect the other four separated uses, resulting in costly infrastructure and heavy traffic (Duany, Plater-Zyberk, & Speck, 2000). Sadly, the neighborhood unit has had little influence on conventional suburbs, in part to both Euclidean zoning regulations and social preferences.

DEFINING CHARACTERISTICS

- Sprawling residential subdivisions with large lots
- Inconvenient or non-existent public transportation
- Destinations within driving distance
- Neighborhood recreation center only
- Auto-oriented scale and architecture
- Curvilinear streets with large blocks
- Disconnected streets to adjacent development
- Front garages overlooking large setbacks
- No front porch or sidewalk
- Front yards with wide driveways
- No sidewalks or street trees
- Private backyards

TRADITIONAL NEIGHBORHOOD DEVELOPMENT

Traditional neighborhood development (TND) is a product of the New Urbanism movement, which looks back to the small American town as an alternative to conventional suburbs. These neighborhoods offer moderate densities, mixed uses, well-interconnected streets, and provisions for the pedestrian and bicyclist. They feature a tapestry of land uses and housing types that are harmoniously designed to create a pleasing walking environment (Southworth and Ben-Joseph, 2003). Homes typically surround an attractive town center that includes retail, restaurants, apartments, and offices. The town center, along with various parks and recreation areas, provide a means of social interaction to develop a sense of community. Like the streetcar suburbs, TND communities feature front porches and sidewalks to create an opportunity for community interaction on a daily basis. The pictures of Celebration, Florida to the right show examples of a TND's town center and residential areas.

DEFINING CHARACTERISTICS

- Large communities with modest lots
- Inconvenient or non-existent public transportation
- Destinations within walking and driving distance
- Community town center with shops, offices, and apartments
- Pedestrian-oriented scale and architecture
- Grid streets in town center; curvilinear streets elsewhere
- Connected streets to adjacent development
- Front porches overlooking modest setbacks
- Strong link between the front porch and the sidewalk
- Front driveways or rear alleys (depending on terrain)
- Sidewalks and street trees
- Community centers and parks



Celebration, Florida

2

Charlotte Case Studies



Charlotte, also known as the “Queen City,” is the largest city in the Carolinas. The city serves as the county seat of Mecklenburg County, North Carolina, with a metropolitan statistical area that spans into South Carolina. Boasting a finance center second only to New York City, national sports teams, and a vision of the “New South,” Charlotte easily attracts new residents from around the country. According to the United States Census Bureau, the Charlotte MSA’s population increased 13.4% from 1,582,627 in 2006, to 1,795,472 in 2011. This outpaced national and state growth levels during the same time period of 4.0% and 9.0%, respectively (United States Census Bureau, 2013). Fortunately, the city offers a variety of living choices, from attractive historic neighborhoods to convenient uptown condominiums to family-oriented suburbs to traditional neighborhood developments (TND).

As with most growing Sunbelt cities, Charlotte’s highway traffic congestion is an increasing concern. Congestion results in longer commutes to work and less time spent with friends and family. According to the 2011 American Community Survey conducted by the United States Census Bureau, the Charlotte MSA has longer commute times than the state and nation, although the majority of drivers commute between 10 to 19 minutes to work. The effects of a growing population and limited road

construction are apparent; the region’s commute times have increased slightly from 2006 to 2011, with proportions in the 10-19 minutes and 30-39 minutes categories increasing the most and shares in the < 10 minutes and 20-29 minutes categories decreasing the most (United States Census Bureau, 2013).

The automobile dominates Charlotte’s primary means of transportation with a 90.0% share, which sits between the state and national shares of 91.0% and 86.1%, respectively. Public transportation, including the CATS bus system and the successful Lynx light rail line, accounts for a mere 2.3% share of transportation mode choice. Walking to destinations in Charlotte is even less common, with only a 1.6% share of transportation mode choice (United States Census Bureau, 2013).

While the statistics for walking to destinations are disappointing, there is hope for some Charlotte neighborhoods in the future. Areas along the Lynx Blue line corridor, spanning from Uptown to south Charlotte, are experiencing dense mixed-use development around transit stations. This transit-oriented development will first allow workers to walk to Lynx stations and ride to employment centers in Uptown Charlotte, and second, offer walkable retail and entertainment destinations. Future expansion of the Lynx light rail system is expected to further walkable development in

the city.

The Charlotte region's continued population growth as well as its diverse neighborhoods are great reasons to study the walkability of the region's neighborhoods. Historic and traditional neighborhoods in the region appear to embrace elements of walkability. In this study, five neighborhoods: two historic, two TND, and one residential subdivision have been chosen for an in-depth look into their walkability. The five selected neighborhoods are the attractive historic enclaves of Dilworth and Myers Park, the comfortable outer-ring suburb of McAlpine, and the popular new urbanist towns of Birkdale Village and Baxter Village. A regional map depicting the locations of each neighborhood is shown to the right, followed by short profiles of each neighborhood.

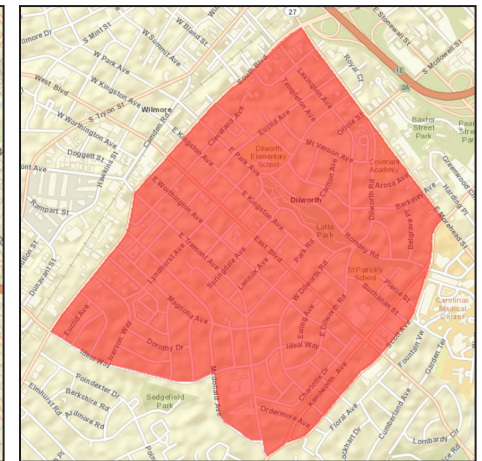
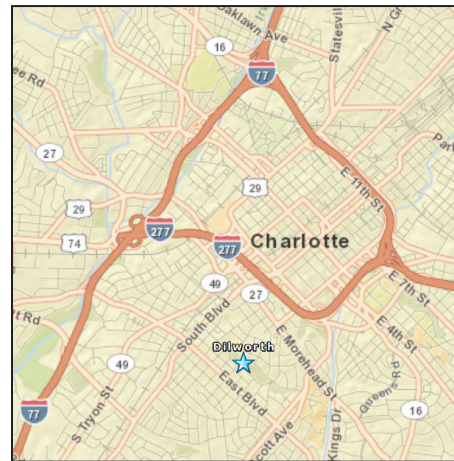
NEIGHBORHOOD CASE STUDIES MAP

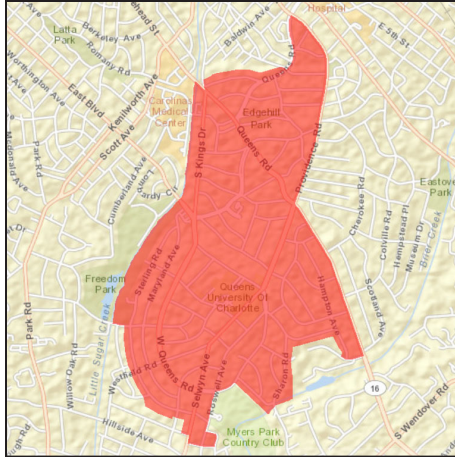
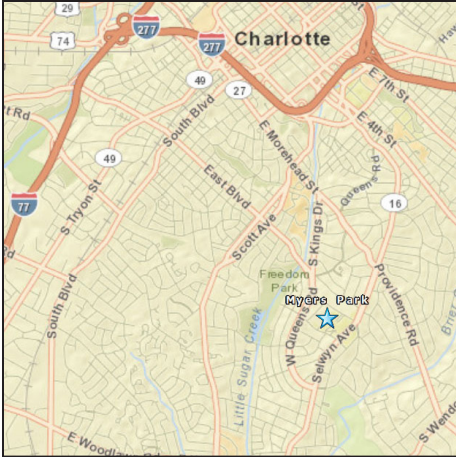


Dilworth

Dilworth was Charlotte's first streetcar suburb, beginning development during the 1890s. Today, the neighborhood remains mostly intact, offering a collection of large Victorian, neo-classical, Colonial revival and Tudor revival homes along with modest bungalow homes built between 1910 and 1920. Newer development consists of "mcmansions" and mixed-use buildings along major streets. Dilworth boasts an attractive park, boutique retail and offices, and easy access to multiple Lynx light rail stations. Walkability and connectivity to a variety of land uses are also strengths of this neighborhood (Charlotte-Mecklenburg Planning Commission, 2006). For all these reasons, Dilworth is one of the most popular places in Charlotte to call home.

Like many other early suburbs in Charlotte, Dilworth fell into disrepair during the 1950s and 1960s. The federal government responded by giving assistance during the 1970s through Neighborhood Improvement and Neighborhood Assistance Programs, which provided funds for physical infrastructure improvements (sidewalks, traffic calming, narrow streets) and housing assistance. In addition, the Dilworth Community Development Association lobbied for, and received, a local historic district designation and other neighborhood improvements. Finally, Dilworth was the first urban area in Charlotte to have a small area plan. This resulted in the down-zoning (and preservation) of roughly 500 homes (Spencer, 2013). Although Dilworth has transformed over time, many of the physical elements that encourage walking have existed since the neighborhood's inception.





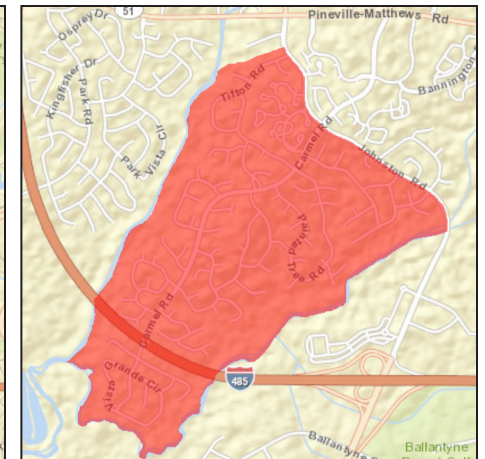
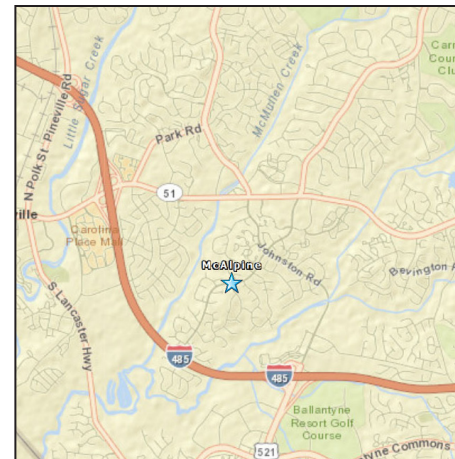
Myers Park

“Country Homes and Country Air, Twenty Minutes from the Square. That’s Myers Park” describes a wealthy Charlotte neighborhood planned by well-respected landscape architect John Nolen. Myers Park originated in 1912 as an affluent streetcar suburb located in the countryside, just outside of Charlotte. One-acre lots were each within two blocks of a boulevard loop (Queens Road) and the streetcar line. At the center of the neighborhood would be Queens College, churches, and other civic buildings. A small retail center along Providence road was planned, but never built. Nolen took great care to design streets, sidewalks, and tree plantings to assure “aesthetic harmony” and to form a spatial hierarchy among primary and secondary streets, even transplanting mature trees to Myers Park to bring “a sense of age and stability” into the neighborhood. Parks and community activities received considerable attention with the creation of a Suburban Club, which offered residents a clubhouse with a swimming pool and tennis courts, along with a golf course. New homes were originally required to meet building standards, such as minimum setbacks, lot sizes, and building prices to maintain land values (Nolen, 1927). Today, one can see that the minimum building price was far exceeded by homes in this neighborhood.

As Nolen advanced a city plan for Charlotte in 1917, Earle Draper took charge of planning Myers Park. He significantly altered Nolen’s plan by smoothing out street curves and creating more small lots, a product of changing tastes towards the automobile (Nolen, 1927). Today’s Myers Park is a product of both Nolen and Draper’s designs, together with the organic change that occurs over a period of time.

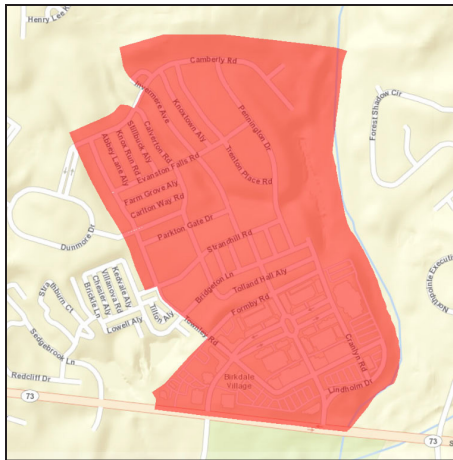
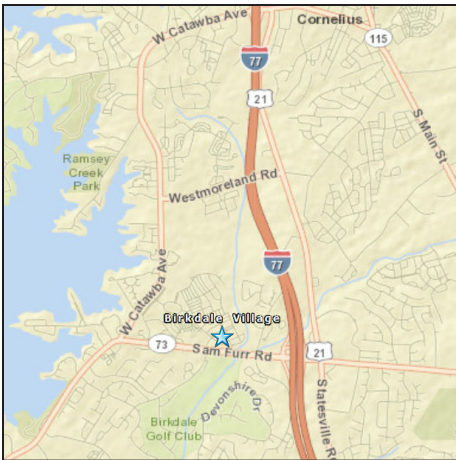
McAlpine

McAlpine is a conventional suburban community that encompasses nine small subdivisions: Ashbrook, Carmel Commons, Carmel Village, Fernbrook, Innisfree, Meadowbrook, Stoneybrook, Terrabrook, and Walden. The community was developed in affluent south Charlotte primarily during the 1970s and 1980s, and features a mix of single-family homes, townhomes, and condominiums. The McMullen Creek and McAlpine Creek greenways surround and provide walking opportunities to the community, although distances to other land uses remain prohibitive. Carmel Road grants primary access to the community, while Johnston Road provides the northern boundary. There are no other land uses than residential within the community boundaries, so the automobile is necessary for reaching most destinations.



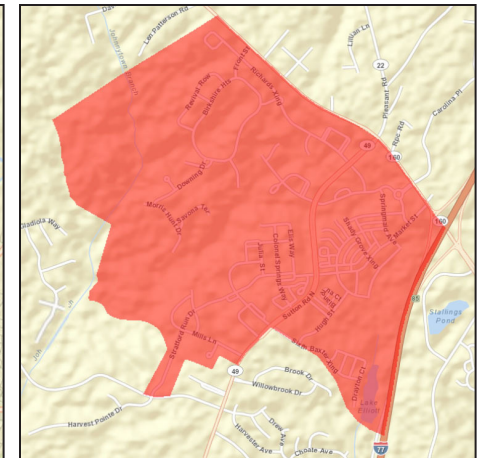
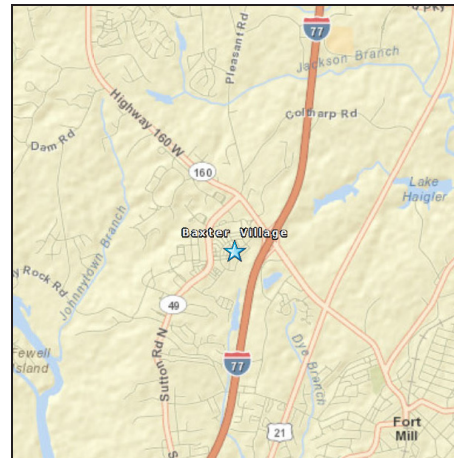
Birkdale Village

Birkdale Village is a traditional neighborhood development constructed during the early 2000s. The neighborhood is located in Huntersville, North Carolina, an affluent bedroom community for Charlotte that offers residents the pleasures of Lake Norman. Birkdale Village centers around an upscale village center featuring shops and restaurants on the street level with apartments and offices on the upper levels. Parks of many shapes and sizes are spread throughout the neighborhood, which has ample sidewalks and street trees to facilitate walking. Residences vary from single family homes to townhomes to apartments. This neighborhood, as with many TNDs, is perceived as a driving destination that supports walking upon arrival.



Baxter Village

Baxter Village is a traditional neighborhood development constructed during the mid-2000s in Fort Mill, South Carolina, another bedroom community for Charlotte. The neighborhood's village center features shops, restaurants, and offices in buildings sporting traditional architecture that reminds visitors of the town's history. Nearby the town center, residents benefit from a YMCA, elementary school, daycare, library, and medical offices. Parks and community centers are spread throughout the neighborhood for residents to enjoy. Baxter Village homes consist of traditional single-family residences on modest lots, along with townhomes representing various architectural styles. Sidewalks and street trees are abundant throughout the neighborhood, as are walking trails through preserved wetlands. Like Birkdale Village, Baxter Village is a walkable community that still requires the automobile to reach employment and other regional destinations.



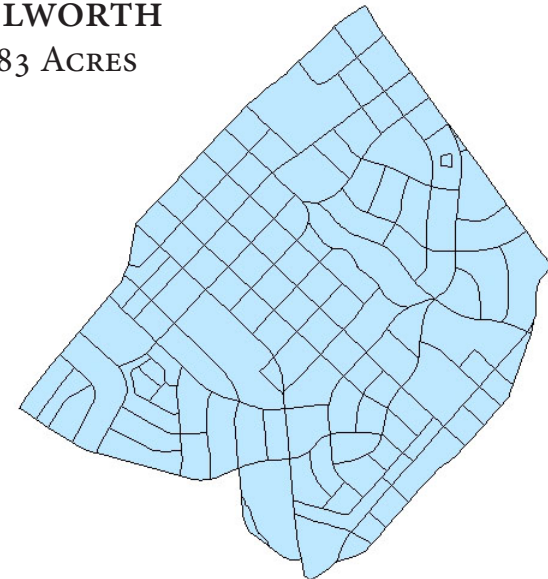
KEY NEIGHBORHOOD ELEMENTS

NEIGHBORHOOD	TOTAL LAND AREA	TOTAL POPULATION (2010)	TOTAL DWELLINGS (2010)	POPULATION DENSITY PER ACRE (2010)	HOUSING DENSITY PER ACRE (2010)	STREET INTERSECTION DENSITY	STREET CONNECTIVITY INDEX	TYPICAL BLOCK LENGTH
DILWORTH	783 Acres	5,498	3,415	7.03	4.36	325	1.89	463 Feet
MYERS PARK	1,077 Acres	6,581	2,751	6.11	2.55	254	1.94	666 Feet
MCALPINE	859 Acres	3,666	1,625	4.27	1.89	201	1.45	440 Feet
BIRKDALE VILLAGE	168 Acres	1,127	678	6.71	4.04	531	1.73	427 Feet
BAXTER VILLAGE	917 Acres	3,181	1,122	3.47	1.22	194	1.64	518 Feet

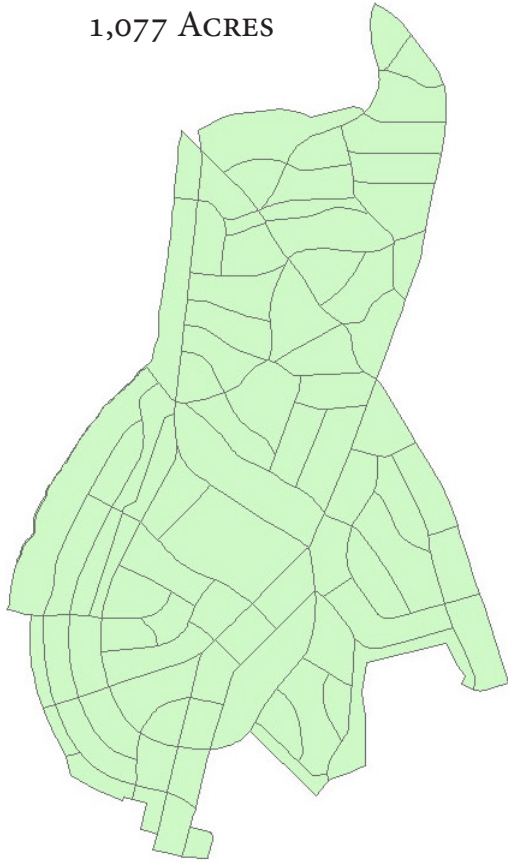
NEIGHBORHOOD SIZE COMPARISON

Neighborhood boundaries have been carefully defined through the synthesis of census blocks and historical neighborhood plats. I have also considered street and natural boundaries for neighborhood definition. Each of the five neighborhood case studies have different land areas, with Birkdale Village covering significantly less space than the other four neighborhoods. Birkdale Village remains true to Perry's suggested ideal neighborhood size of 160 acres, while the other four communities could hold nearly five neighborhood units within their boundaries. The following figures show each neighborhood on the same scale in order to depict these size disparities.

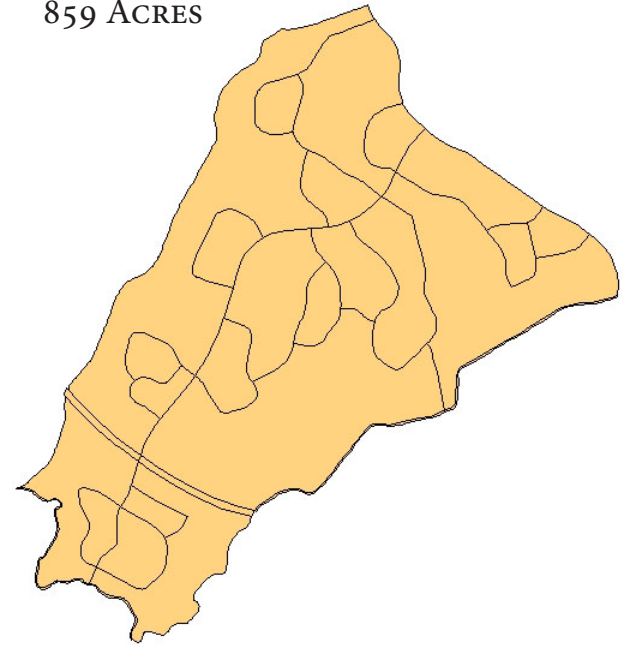
DILWORTH
783 ACRES



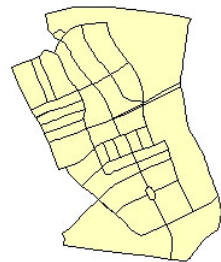
MYERS PARK
1,077 ACRES



MCALPINE
859 ACRES



**BIRKDALE
VILLAGE**
168 ACRES



**BAXTER
VILLAGE**
917 ACRES



PART 3

NEIGHBORHOOD EVALUATION

3. DIVERSITY

4. DENSITY

5. DESIGN: LAND USE AND BUILDINGS

6. DESIGN: STREETS AND ENCLOSURE

7. DISTANCE TO TRANSIT

8. DESTINATION ACCESSIBILITY

3

Diversity



The first of the six key characteristics of the built environment to promote walkability is diversity. Diversity is described as a mix of uses, both residential and commercial, that are located within the neighborhood. Diversity is represented in a variety of commercial shops and services, and residences consisting of townhouses, apartments, and single-family homes. The greater the diversity, the less there is a need to drive to find goods and services. Strong diversity not only brings goods and services into the neighborhood; it also provides employment within walking distance of residences. Combined with a housing mix that offers affordable housing for various incomes, employees can live and work in the same community, rather than being forced to drive from a more affordable location further away.

Diversity encourages walking for all, regardless of place of employment. This element serves not only needs for goods and services, but for the human's desire for social interaction. Urban theorist Ray Oldenburg coined the term "Third Places" to describe coffee shops, pubs, and local markets as places for people to mingle and have social interactions (Oldenburg, 1989). The presence of such uses, along with many others, can lead to a place that is vibrant 24 hours a day (United States Green Building Council, 2013). Such destinations must be inviting to pedestrians.

NEIGHBORHOOD COMPLETENESS

In this chapter, we will compare the diversity of uses and the housing mix among the five case study neighborhoods. We will measure the diversity of uses through a neighborhood completeness model that was introduced by Criterion Planners, and published in Douglas Farr's book *Sustainable Urbanism* in 2008. This model measures the amount and concentration of pedestrian destinations within the neighborhoods, and is composed of three factors:

Level of Neighborhood Completeness: Presence of destinations.

Critical Mass: Concentration of pedestrian destinations.

Neighborhood Completeness Indicator: Number of unique destinations multiplied by the proportion of them within critical mass.

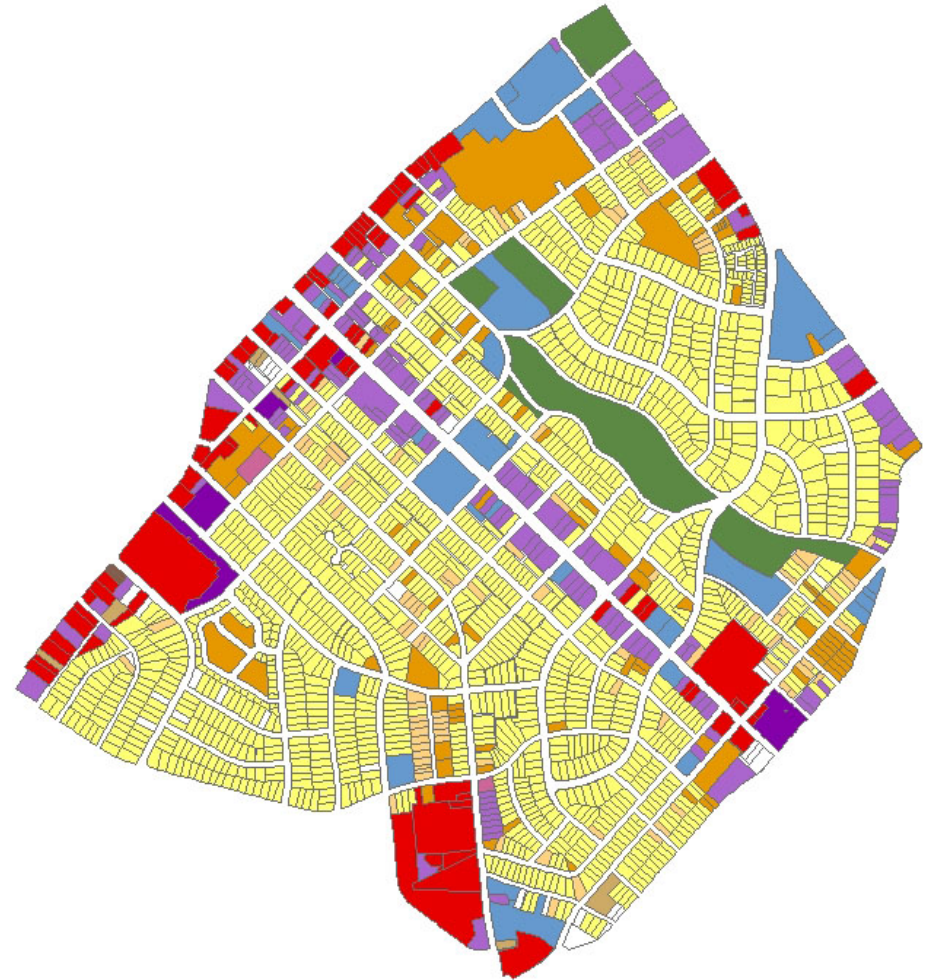
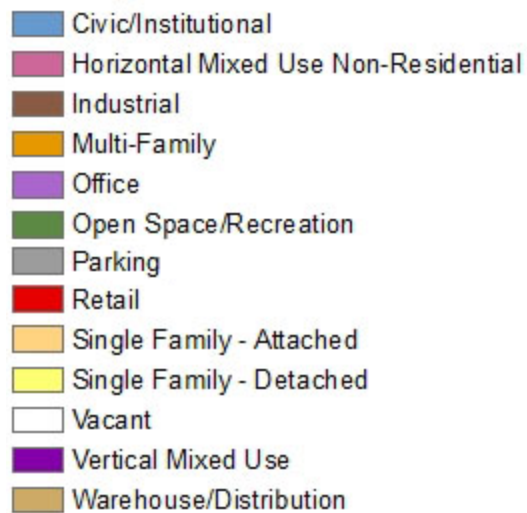
HOUSING MIX

We will also compare the housing mix among neighborhoods by measuring the proportion of single family homes to multi-family and townhouse residences. Neighborhoods that offer a wider variety of home types will be preferred over more homogeneous neighborhoods, as less opportunity exists for varied incomes within these communities.

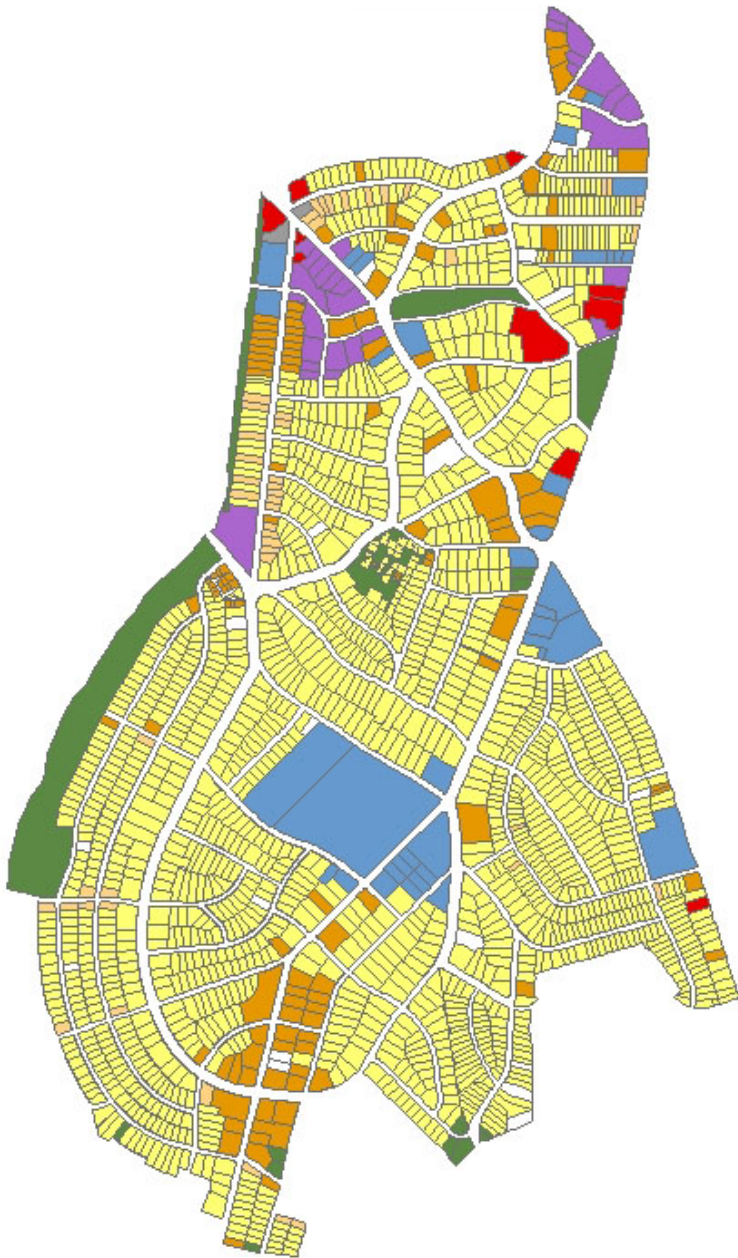
DIVERSITY OF USES

Diversity of uses is best seen through a map of existing land uses. The following figures show the existing land uses for each of the case studies. The following trends emerge from these maps: historic neighborhoods have more dispersed land uses, with intensities along the edges; conventional suburban neighborhoods are almost purely residential in character; and traditional neighborhood developments have concentrated diverse uses within a town center, often located along the edge of the neighborhood. The land use maps will inform the determination of the Neighborhood Completeness Indicator and the housing mix in the following sections of my neighborhood diversity analysis.

Existing Land Use



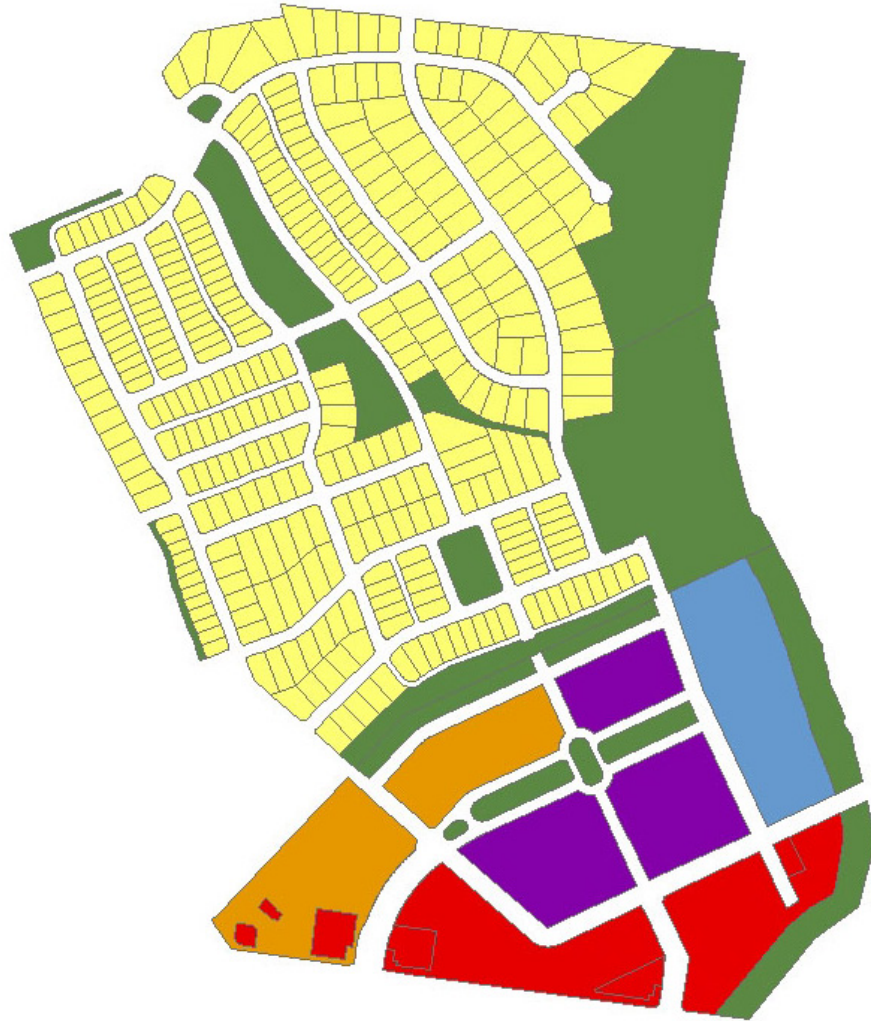
MYERS PARK



MCALPINE



BIRKDALE VILLAGE



BAXTER VILLAGE



NEIGHBORHOOD COMPLETENESS

Diversity of land uses and the concentration of these uses is best analyzed through the neighborhood completeness model, which measures the amount of pedestrian destinations and the percentage of these places in concentrated areas, and then multiplies the two values together to find the indicator.

First, I selected 20 possible pedestrian destinations from the list provided in *Sustainable Urbanism*. These possible destinations are seen in the top table to the right. Next, I researched the neighborhoods using Google Maps to find these destinations within each community. The land uses within each neighborhood are depicted through word clouds, where larger type means more locations of each use, while scores and score values shown in the tables to the right.

Next, I mapped the land uses to determine where critical mass pedestrian sheds existed. Research shows that people will walk ¼ mile to run daily errands, and ½ mile to reach transit or more specialized shops or civic uses (United States Green Building Council, 2013). As a result, pedestrian sheds cover ¼ mile, with overlapping radii for critical mass sheds. For the case studies, I found more than one critical mass to be possible, so I selected the largest as the primary critical mass, and additional sheds as secondary critical masses. The two masses are displayed in **green** (primary) and **orange** (secondary) in the walking destination maps for each neighborhood, shown on the following pages. Pedestrian sheds outside critical masses are **yellow**.

Finally, the neighborhood completeness indicator was calculated by multiplying the number of unique land uses in the neighborhood by the percentage of those uses within the primary pedestrian critical mass shed. The score values are shown in middle right table, and the complete results for each neighborhood are shown at the bottom right table.

POSSIBLE PEDESTRIAN DESTINATIONS

Park	Daycare Center	Dry Cleaners
School	Supermarket	Hair Salon
Community Center	Convenience Store	Doctor's Office
Church	Hardware Store	Dentist's Office
Library	Fitness Club	Senior Care Center
Post Office	Restaurant	Pharmacy
Police/Fire Station	Bank	

NEIGHBORHOOD COMPLETENESS SCORE VALUES

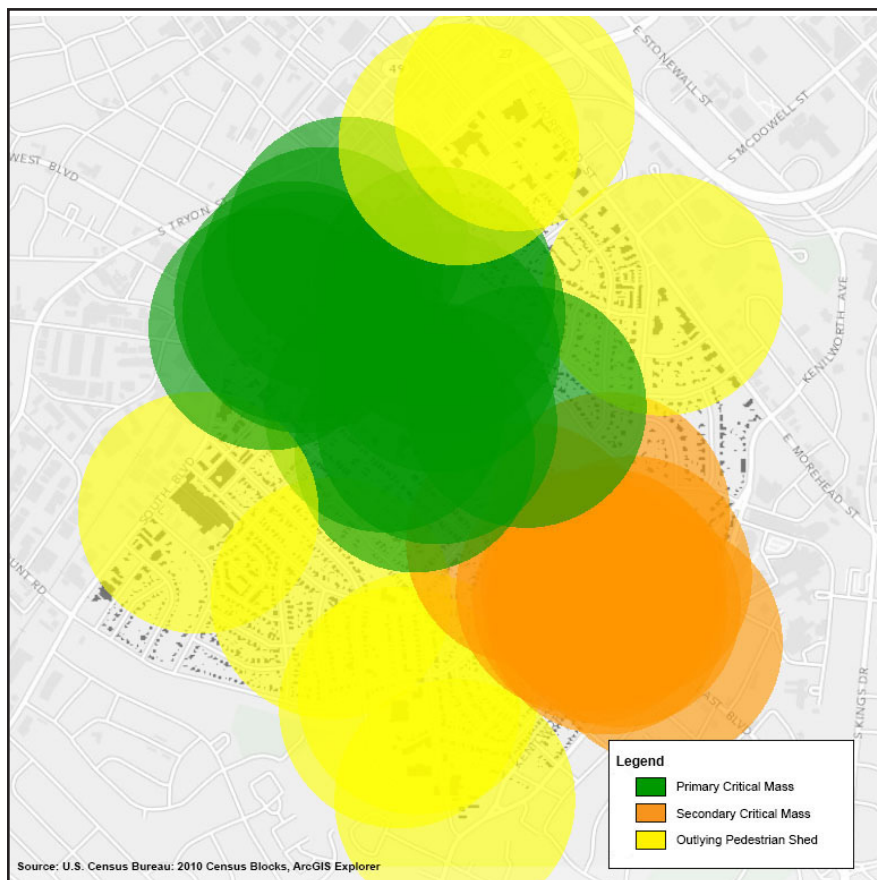
SCORE VALUE	% OF USES PRESENT	INDICATOR
EXCELLENT	70% - 100%	10 - 20
SATISFACTORY	30% - 70%	5 - 10
MINIMAL	10% - 30%	3 - 5
POOR	0% - 10%	0 - 3

CASE STUDY SCORES

NEIGHBORHOOD	POSSIBLE USES PRESENT / %	% OF USES IN PED. SHED	OVERALL INDICATOR
DILWORTH	18 / 90%	72%	13
MYERS PARK	13 / 65%	54%	7
MCALPINE	1 / 5%	100%	1
BIRKDALE VILLAGE	7 / 35%	100%	7
BAXTER VILLAGE	12 / 60%	83%	10

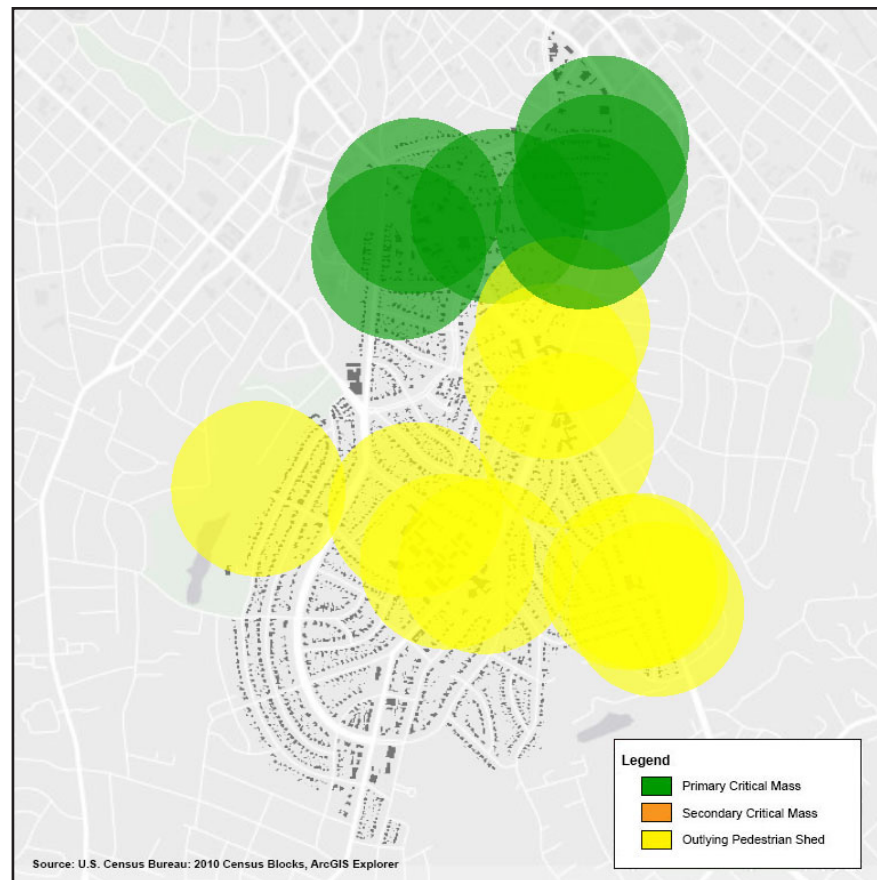
DILWORTH

NEIGHBORHOOD COMPLETENESS INDICATOR: 13



MYERS PARK

NEIGHBORHOOD COMPLETENESS INDICATOR: 7

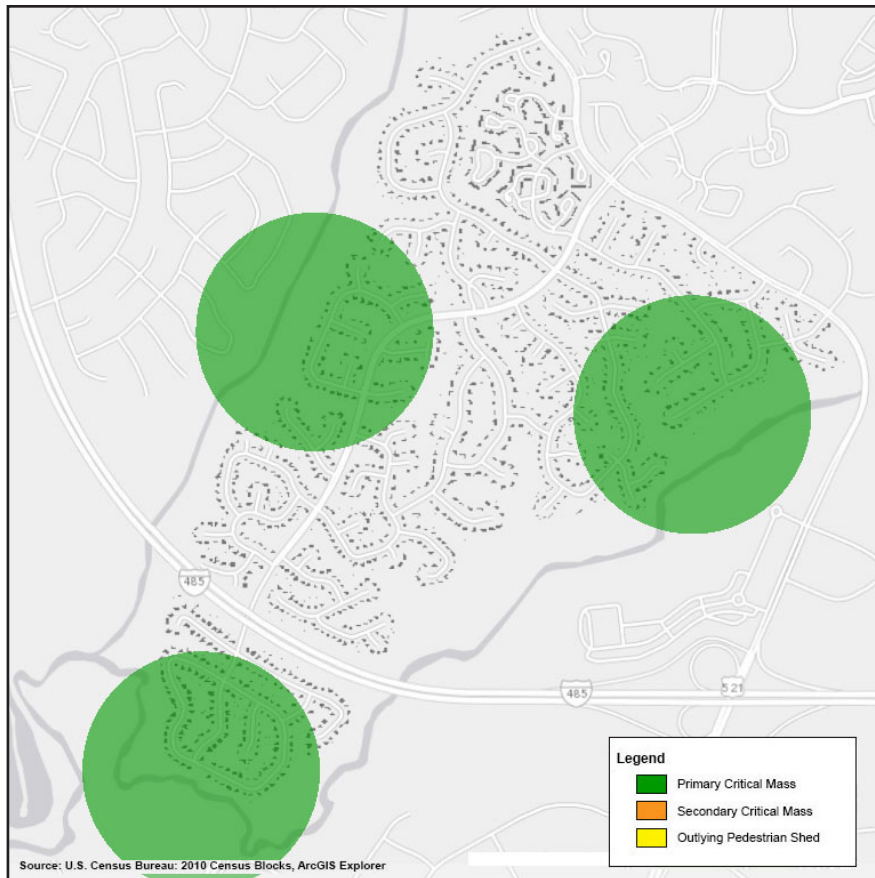


Restaurant
 Doctor's Office
 Daycare Center
 Dry Cleaners
 Fitness Club
 School
 Pharmacy
 Hair Salon
 church
 Convenience Store
 Dentist's Office
 Bank
 Supermarket
 Senior Care Center
 Park
 Hardware Store
 Police/Fire Station

Bank
 Hair Salon
 Convenience Store
 Restaurant
 Doctor's Office
 Daycare Center
 Pharmacy
 Park
 School
 Library
 church
 Dentist's Office
 Senior Care Center

McALPINE

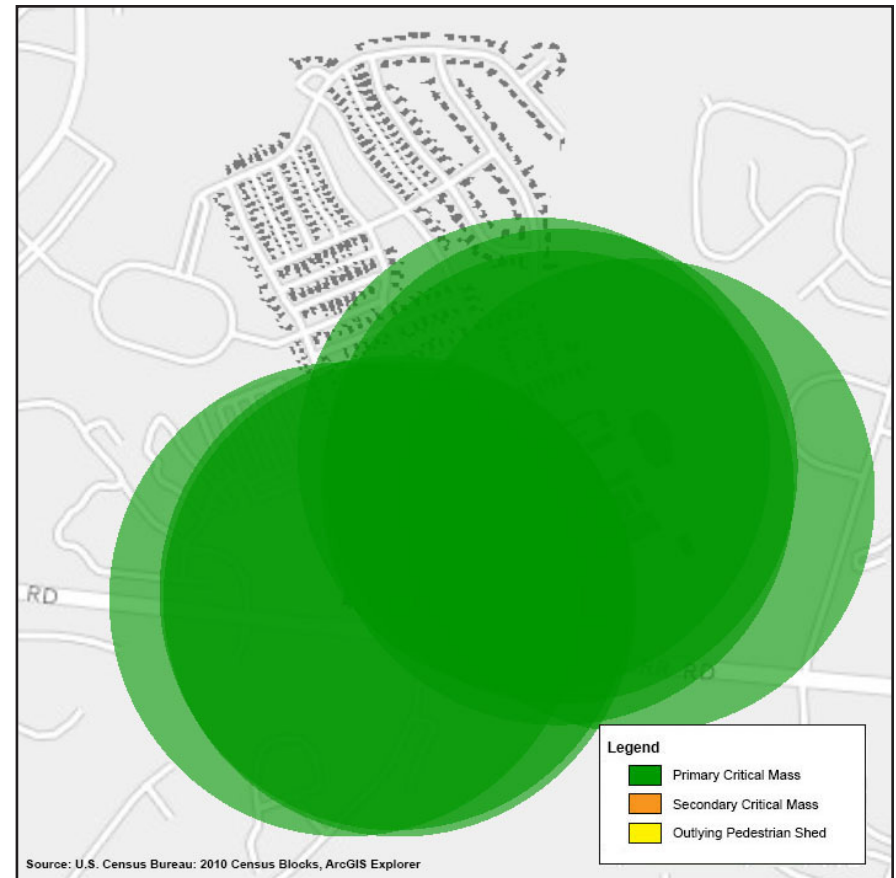
NEIGHBORHOOD COMPLETENESS INDICATOR: 1



Park

BIRKDALE VILLAGE

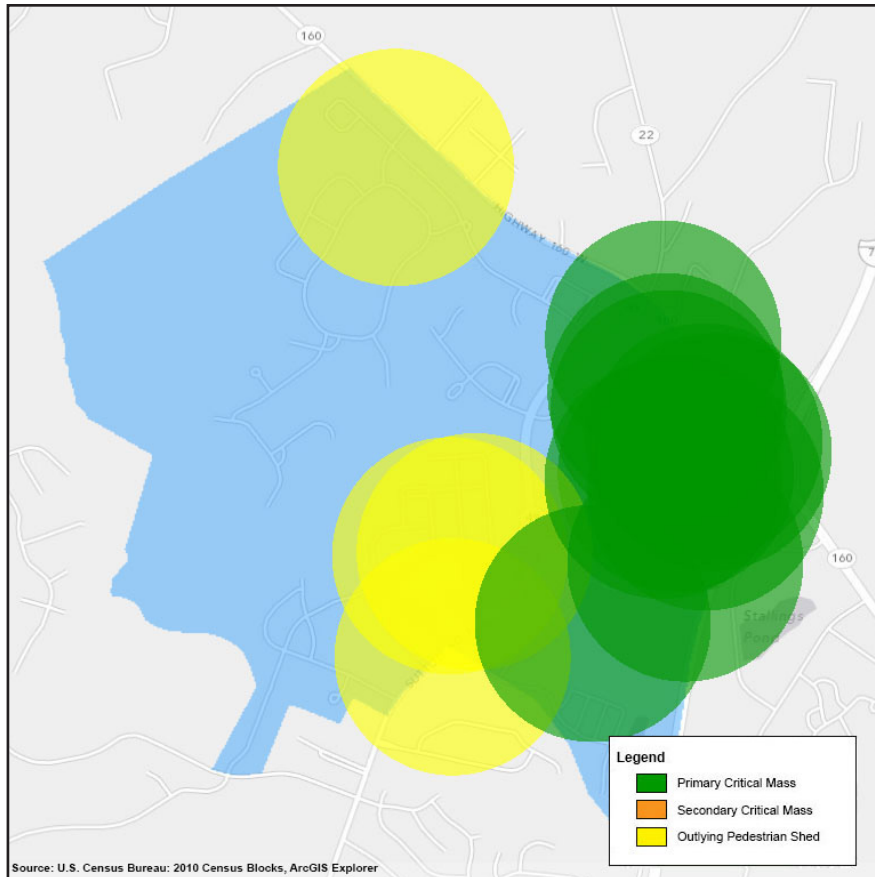
NEIGHBORHOOD COMPLETENESS INDICATOR: 7



Pharmacy
Convenience Store
Dry Cleaners
Park
Hair Salon
Bank
Restaurant

BAXTER VILLAGE

NEIGHBORHOOD COMPLETENESS INDICATOR: 10



Community Center
Fitness Club
Dentist's Office
Daycare Center
Hair Salon
Library
Church
Doctor's Office
School
Restaurant
Park

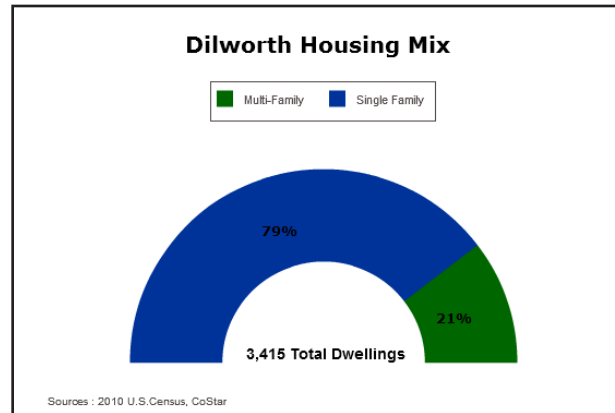
PICTURES OF DIVERSITY OF USES



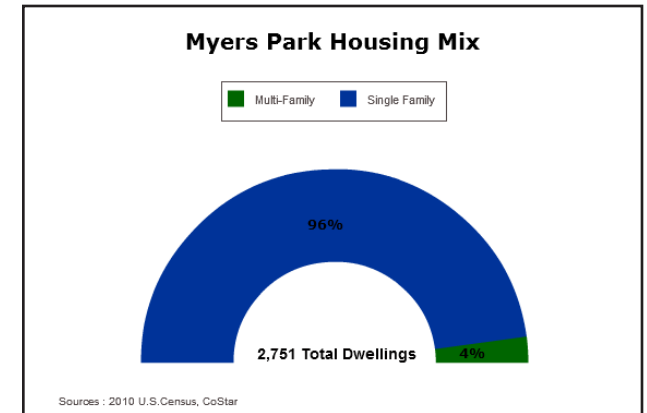
Housing Mix

A neighborhood's diverse housing mix is key to the inclusion of people with varying income levels. Homes of all shapes, sizes, and densities make a neighborhood affordable across many income levels and create an architecturally interesting environment for pedestrians to enjoy. Social interaction among diverse residents often leads to the vibrant community that many people seek out when searching for a place to live. The following figures show the mix of single family and multi-family residences for each case study. Pictures also give a visual example of the housing mix within each neighborhood.

DILWORTH



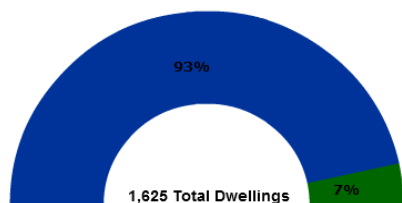
MYERS PARK



McALPINE

McAlpine Housing Mix

Multi-Family Single Family

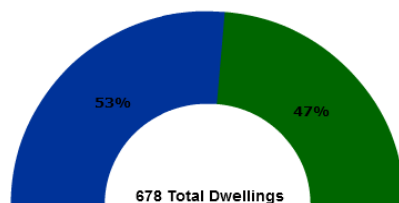


Sources : 2010 U.S.Census, CoStar

BIRKDALE VILLAGE

Birkdale Village Housing Mix

Multi-Family Single Family

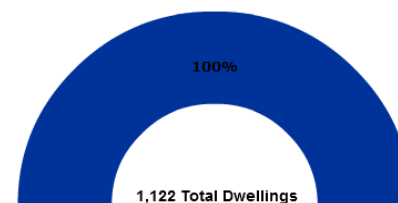


Sources : 2010 U.S.Census, CoStar

BAXTER VILLAGE

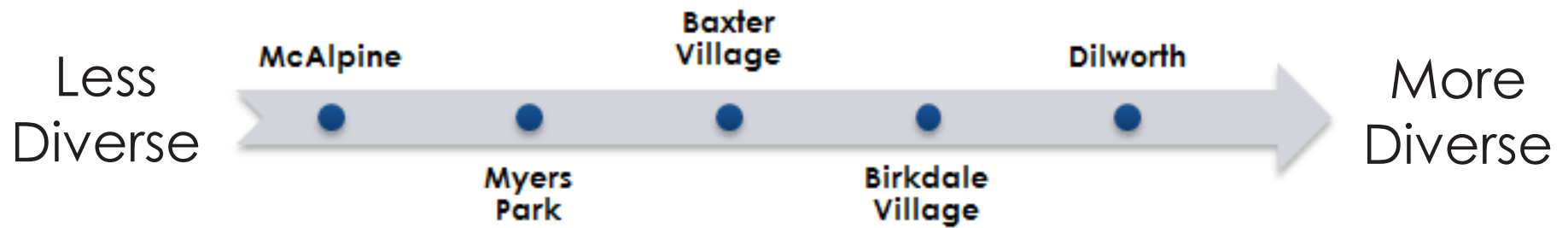
Baxter Village Housing Mix

Multi-Family Single Family



Sources : 2010 U.S.Census, CoStar





DILWORTH

Dilworth is clearly the winner in regards to neighborhood completeness. Not only does the neighborhood have retail uses along its arterial borders, but retail and civic uses are scattered throughout. There are two pedestrian critical mass sheds within Dilworth, both along the East Boulevard corridor. These sheds serve a large portion of the neighborhood with walkable destinations.

Dilworth's housing mix is also strong, with 21 percent of multi-family residences within the community. These residences come in various shapes and sizes, creating visual interest. While Dilworth was originally developed as a residential suburb with some civic destinations, time has transformed Dilworth into a diverse, thriving neighborhood that remains one of the most popular places to live, work, and play in Charlotte.

BIRKDALE VILLAGE

Birkdale Village represents New Urbanism with a town center that is concentrated in mostly retail uses. Unfortunately, a substantial portion of residents are beyond walking range to the town center that's location appeals more to drivers from Charlotte than to all residents. Despite this concern, Birkdale's housing mix is the strongest of all the case studies.

BAXTER VILLAGE

Baxter Village has a similar design to Birkdale Village, with the town center being located along an arterial border. Likewise, many destinations are beyond walking distance for most residents. Baxter performs well in the neighborhood completeness indicator, but fails to offer any multi-family residences for mixed incomes.

MYERS PARK

Myers Park is the premier address in Charlotte, and has been since its inception. As a result, the central neighborhood contains mostly residential and civic uses, while offices and retail have encroached along the edges. The sheer size of Myers Park and its strong residential preference makes locating pedestrian sheds to cover the neighborhood difficult. As a result, many residents must bike or drive to destinations. Also, density in the form of multi-family units may be viewed as undesirable to Myers Park's affluent residents. The overwhelming proportion of single-family homes is likely due to this perception.

MCALPINE

McAlpine is a prime example of a residential subdivision that miserably fails the diversity test. The neighborhood offers access to the surrounding greenway, but features nothing other than residential land uses. Residents must drive to all destinations for goods and services. McAlpine's housing mix is also weak, featuring few multi-family units in relation to single family homes. No rental communities exist in this neighborhood.

4

Density



Density is defined as the intensity of a particular element or activity, most often used in planning for describing population, housing, or jobs. Planners have long advocated for higher densities within compact development to reduce sprawl. Increasing residential densities (the number of rooftops) would likely enhance the attractiveness of the community to retail and office users, which would result in greater diversity and higher walkability. Residents within the community would likely support these businesses which are convenient to home. For these reasons, planners consider density to be the key to lowering vehicle miles traveled.

Recent research has made slightly different conclusions concerning density. Studies have found that density alone is not sufficient to reduce driving, rather density must be applied with other elements, such as destination accessibility, to make an impact on driving. As an example, a high-rise building in a remote location will still require driving to reach necessary destinations. The same high-rise building located with easy access to transit and destinations with goods and services would encourage walking. Although density is a factor in reducing driving, it cannot be implemented alone (Ewing and Cervero, 2010).

Although no optimal density exists, there is a favorable range that makes public transportation viable and services available. The lower limits

start around eight dwelling units per acre for housing density, and 7,000 persons per square mile for population density. The upper limits of these ranges vary by each city's built environment (Campoli, 2012). As you will see on the following pages, none of the neighborhood case studies reach the minimum threshold. Furthermore, few of America's cities are dense enough to support transit and services at adequate levels. Clearly, density must increase for America to move forward without the auto.

In this chapter, I introduce census block data to map the population and housing densities within each neighborhood. We will compare these densities by neighborhood development era: street car suburbs, conventional suburbs, and traditional neighborhood development (New Urbanism) to see what trends exist between each neighborhood structure. I have also included figures to better visualize abstract density data.

POPULATION DENSITY

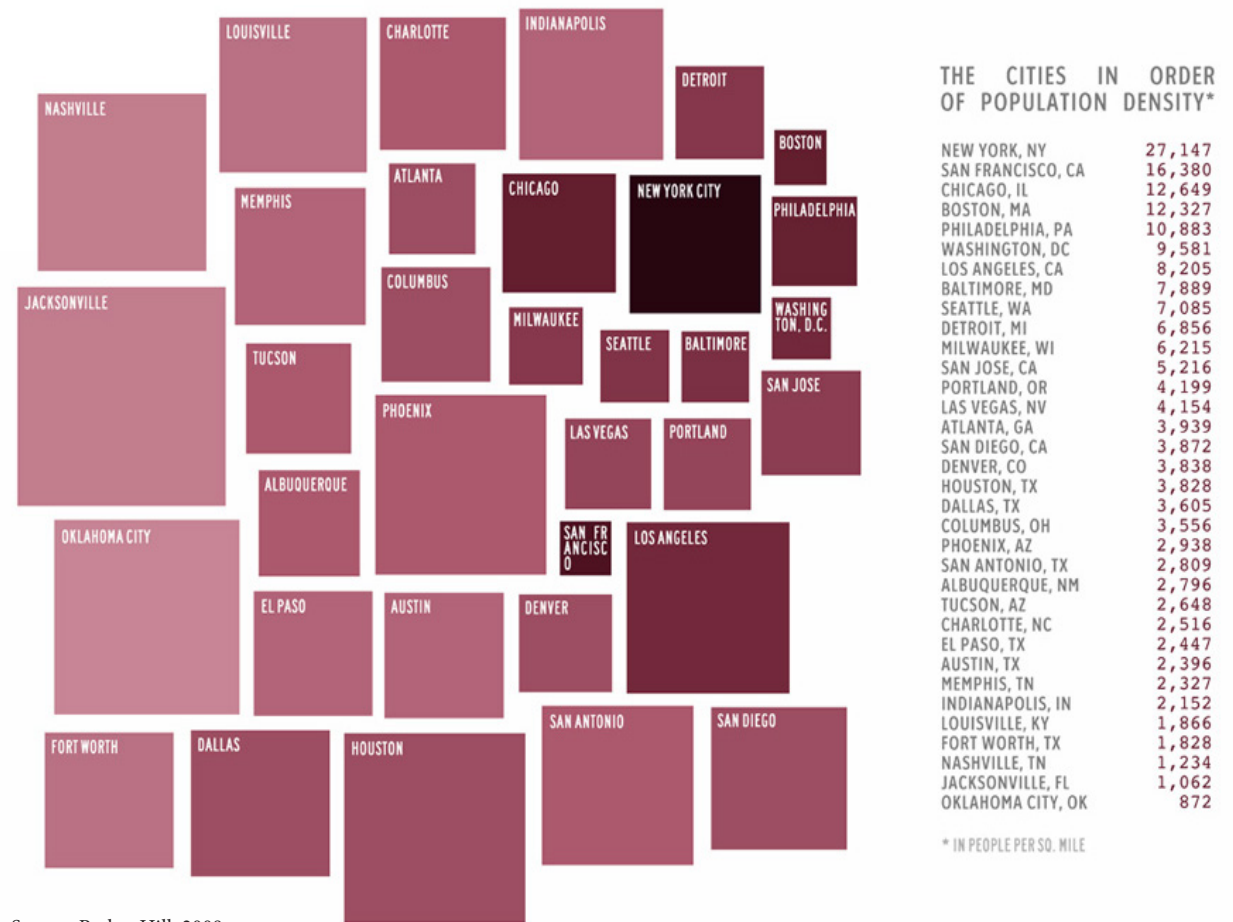
Population density is one key factor in a neighborhood's walkability. Higher densities increase the likelihood of social interaction within the community, as residents in dense communities are more likely to see each other on a regular basis, as compared to a low-density suburb where homes are more exclusive on large lots surrounded by fences.

The figure to the right compares population densities among cities of the United States, with a comparison to the case studies below. As previously mentioned, the 7,000 persons per square mile threshold to support transit and services is a challenge for most places to reach.

The population density maps uncover some interesting trends among development eras. First, the historic neighborhoods have more dispersed density, with higher densities located near their edges. Second, the conventional suburb has low densities throughout. Third, the traditional neighborhood developments have a dense town center, with lower densities towards their edges.

One weakness of the density maps is their failure to separate green space and developed space within census blocks. For this reason, densities appear low, when the reality is that moderate density is balanced out by much green space. This is the case with Baxter Village.

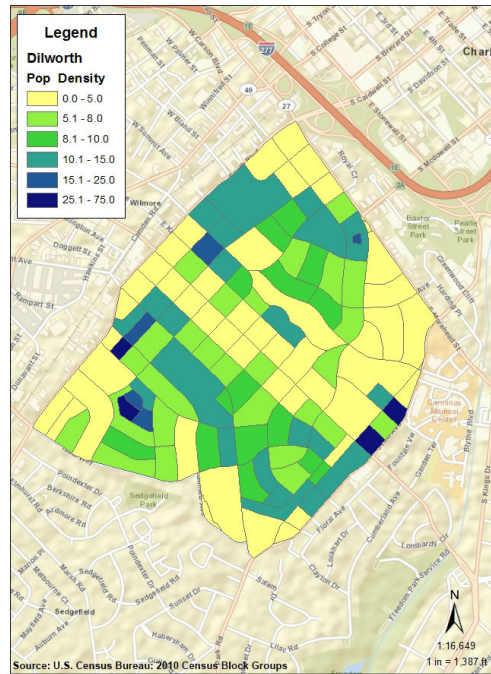
VISUALIZING POPULATION DENSITY



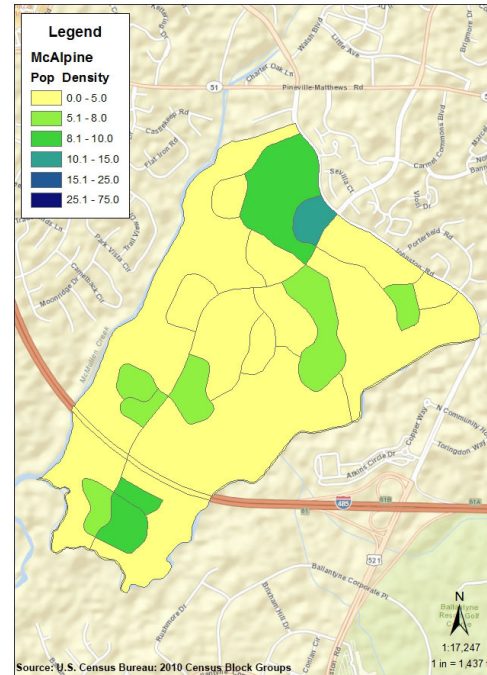
Source: Parker Hill, 2008

NEIGHBORHOOD	POPULATION PER ACRE	POPULATION PER SQUARE MILE
DILWORTH	7.0	4,496
MYERS PARK	6.1	3,912
McALPINE	4.3	2,732
BIRKDALE VILLAGE	6.7	4,295
BAXTER VILLAGE	3.5	2,220

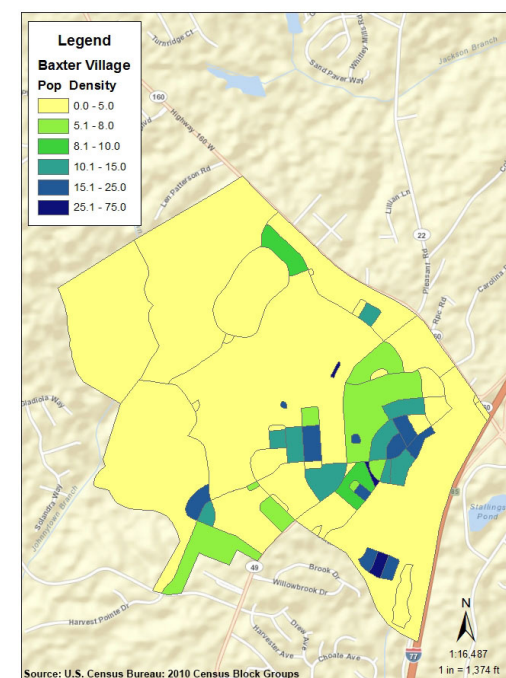
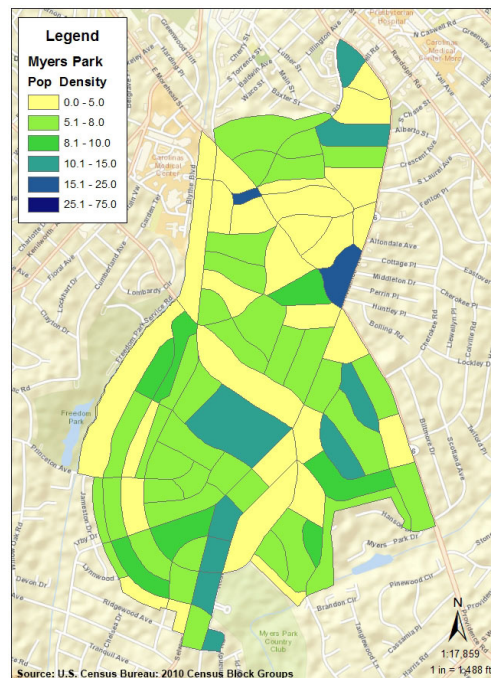
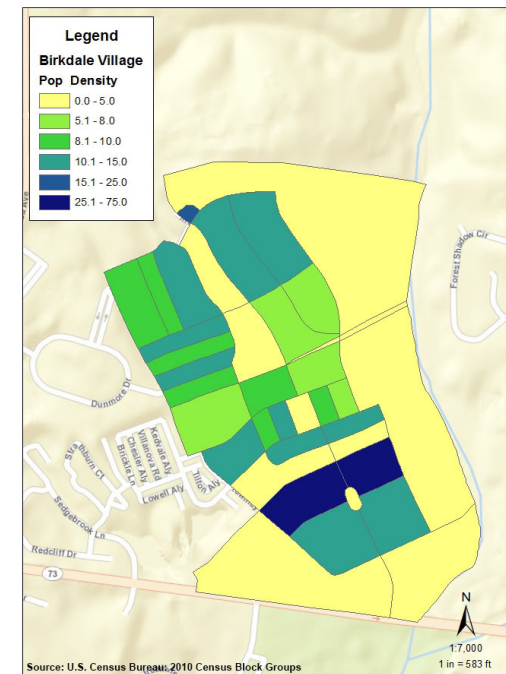
STREETCAR SUBURB



CONVENTIONAL SUBURB



NEW URBANISM



HOUSING DENSITY

Housing density is highly related to population density, as what type of residence is built defines the amount of population that can reside in that space. Dense populations are best afforded in mixed-use, mid-rise and high-rise residences, while sparse populations are found in single family, detached dwellings. The figures to the right depict residences of various densities to better visualize densities of the case studies, which are seen in the table below.

Housing density trends reflect those of population density for the case studies. Dilworth and Birkdale Village have the highest housing densities, which are better dispersed within the neighborhoods as compared to the other case studies. As with population, housing densities are artificially low for Baxter Village. Census blocks that share wetlands and housing tend to balance out the neighborhood's moderate densities, which are similar to Birkdale Village.

NEIGHBORHOOD	DWELLINGS PER ACRE
DILWORTH	4.4
MYERS PARK	2.6
MCALPINE	1.9
BIRKDALE VILLAGE	4.0
BAXTER VILLAGE	1.2

VISUALIZING HOUSING DENSITY

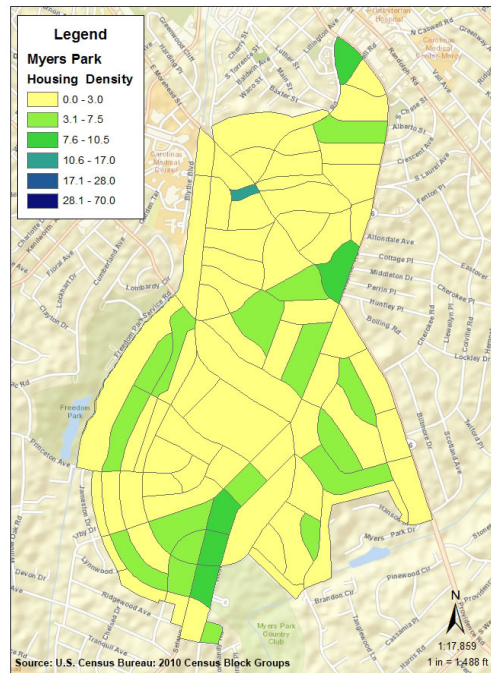
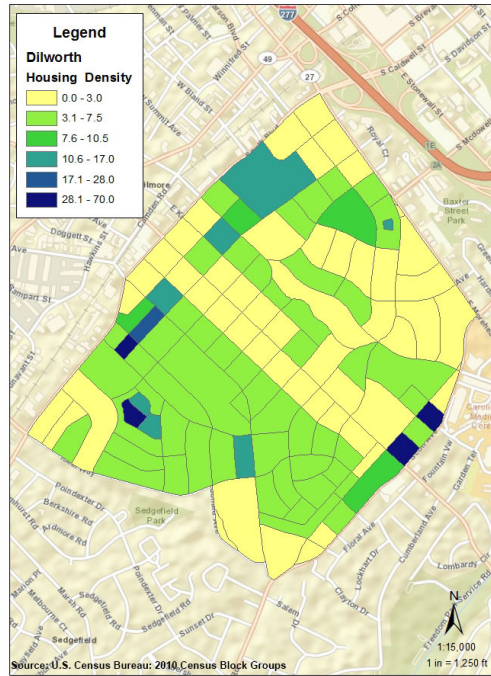
Type	1/4 A.C. Large Lot	Neighborhood Lot	Small Lot	Duplex	Townhouse	Townhouse
Lot Configuration						
Image						
Building Height	2-Story	2-Story	2-Story	2-Story	2-Story	3-Story
Gross Density	3 D.U. / A.C.	5 D.U. / A.C.	7.5 D.U. / A.C.	9.5 D.U. / A.C.	10.5 D.U. / A.C.	17 D.U. / A.C.

Type	Stacked Maisonette / 2over 2	Live/Work	Charleston 3 Unit	Manor / Small Apt	Medium Apartment	Texas Donut
Lot Configuration						
Image						
Building Height	3 to 3-1/2-Story	3-Story	3-Story	2 to 2-1/2-Story	3-Story	4-Story
Gross Density	22 D.U. / A.C.	20 D.U. / A.C.	24 D.U. / A.C.	28 D.U. / A.C.	28 D.U. / A.C.	55 D.U. / A.C.

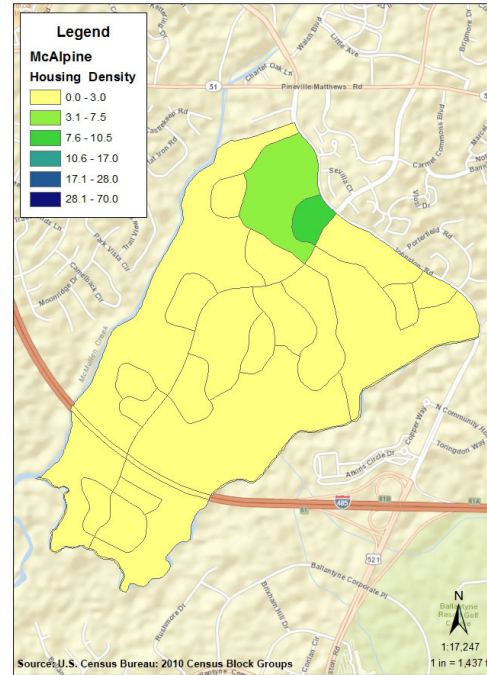
Type	Mixed-use res. / Retail	Office / Retail	Office / Retail (2 sides) w/ Res. Deck Liner	Mid-rise Apt / Hotel	High-rise res. / Retail	High-rise office / Retail
Lot Configuration						
Image						
Building Height	3 to 4-Story	2-Story	4-Story	6-Story	7+ Story	7+ Story
Gross Density	57,000gsf / A.C.	36,000gsf / A.C.	63,000gsf / A.C.	70 D.U. / A.C.	80+ D.U. / A.C.	100,000+ gsf / A.C.

Source: Torti Gallas and Partners, Inc.

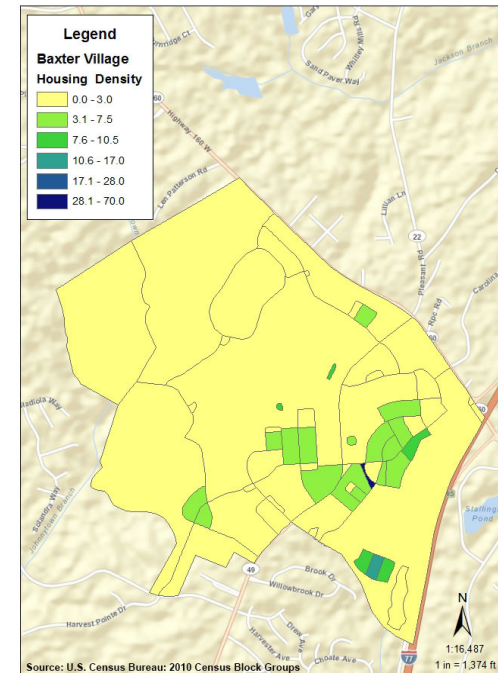
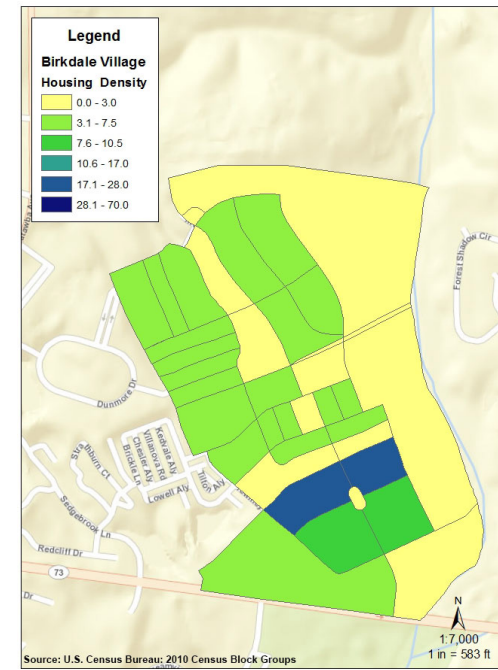
STREETCAR SUBURB

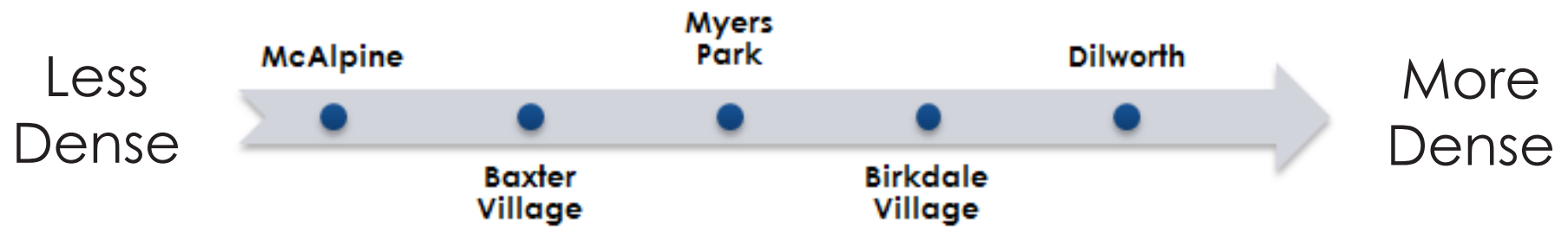


CONVENTIONAL SUBURB



NEW URBANISM





DILWORTH

Dilworth has the highest population and housing densities of all five case studies. The neighborhood features housing in the form of mixed-use apartments, single family homes, and townhomes. Density is dispersed throughout the community, rather than having a dense core surrounded by low density development. There is a wide range of density in Dilworth, likely a result of its strong housing mix and diverse commercial spaces. The neighborhood's strong diversity and density performance may lead to a high degree of walkability.

BIRKDALE VILLAGE

Birkdale Village has the second highest population and housing densities, slightly under Dilworth's values. The neighborhood's structure differs from Dilworth, in that the town center features the highest densities, where the mixed-use apartments exist, with moderate densities of single family homes and townhouses in residential areas. Low density areas contain surface parking and green space.

MYERS PARK

While Myers Park has higher densities than two of the case studies, it remains a single family community of relatively low density. Myers Park lacks housing density, but has moderate population density, meaning that the neighborhood's stately residences likely house families. The housing density map supports housing mix data from Chapter 3, stating that few multi-family units exist in Myers Park. Future infill development along the edges will likely increase densities with multi-family units.

BAXTER VILLAGE

Baxter Village faces mixed results for population and housing densities. Densities in and around the town center are more supportive of walking than those in purely residential areas. Although the neighborhood is the worst performer in overall housing and population densities, these values are suppressed by the existence of wetlands throughout the property that balance out higher densities. Still, the lack of town centers to serve the entire neighborhood would require continued automobile use.

MCALPINE

McAlpine is overwhelmingly low density, with slightly higher densities in areas containing townhomes and condominiums. Homes are located on comparatively larger lots, which are more private than the other case studies. These densities are unlikely to support commercial development within the community.

5

Design: Land Use and Buildings



In the previous chapter, we learned how density affects walkability. While density is a key indicator of walkability, the design and placement of these structures and their parking facilities are also important. As mentioned in the introduction, one study suggests that “the most important variable in predicting a change in walking is a change in attractiveness” (Handy & Mokhtarian, 2005). Historic urban design concepts such as enclosure, human scale, architectural diversity, transparency, and permeability work together to create an attractive walking environment. Unfortunately, many of these design elements have been lost in auto-centric suburban subdivisions, and require deliberate efforts to be reinstated to the neighborhood landscape (Campoli, 2012).

Thoughtful design creates an environment that is not only attractive, but safe and welcoming to pedestrians. Design starts at a neighborhood level, where streets are drawn and homes and amenities are placed. At the structure level, building scale and architectural considerations are made. Finally, at the street level, pedestrian elements such as benches, tables, or awnings are added to enhance walking comfort. This chapter will discuss design elements in the private realm of neighborhood land use and buildings, while the following chapter will look at the public realm of streets and spatial enclosure.

First, we will look at how the placement of amenities within the neighborhood affects walkability. We will consider the dispersion of parks and open space as well as the inclusion of civic uses, such as churches and recreation facilities within the neighborhood. We will also review parking placement at activity nodes and discuss its implications on walking.

Next, we will zoom to the parcel level to see how the placement of structures on the lot impacts how walkable these civic destinations are. While at the structure level, we will consider the scale of neighborhood residences and town centers and think about the impacts on enclosure and social interaction. Architectural diversity is another important factor at this level.

Finally, at the street level, we will take a photographic tour of pedestrian elements within the neighborhood case studies. This includes semi-public elements such as porches and awnings that promote socialization, as well as cafe tables and benches. All of these elements should be present to create an attractive environment for neighborhood pedestrians.

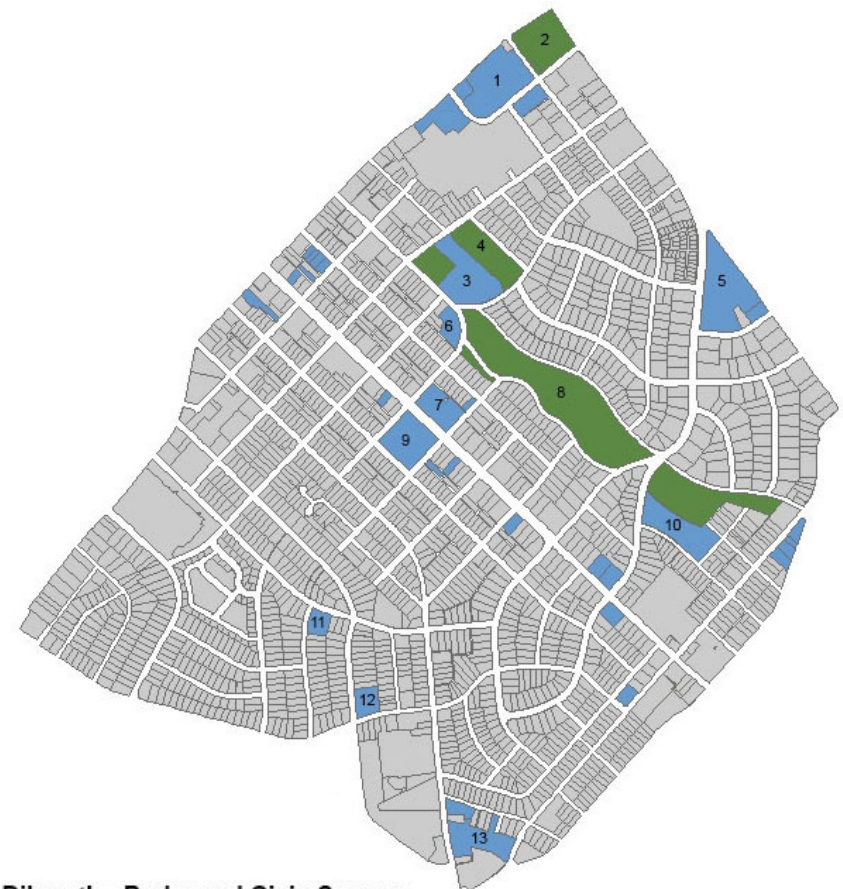
NEIGHBORHOOD AMENITIES

Perry's neighborhood unit integrates parks, recreational spaces, and schools into the neighborhood to allow for physical, mental, and social well being. Both streetcar suburbs and traditional neighborhood developments recognize the importance of these neighborhood elements, while today's conventional suburbs often place such amenities within driving distance. This contrast is quite clear in the following land use plans, where McAlpine offers its residents fewer and less accessible amenities than the other neighborhood case studies.

The LEED-ND Rating System speaks to the placement of civic and recreational spaces, as well as schools. It mandates civic or passive-use space to be located within a ¼ mile walking distance of 90% of both residential and commercial entrances, and to have a median size of ½ acre for these spaces across the neighborhood. Likewise, outside recreation facilities of at least one acre, or indoor recreation facilities of at least 25,000 square feet, must be located within a ½ mile walk of both residential and commercial entrances. Finally, elementary and middle schools should be located within a ½ mile walk of at least 50% of dwelling units in the neighborhood, while a high school can be located within one mile (United States Green Building Council, 2013).

Neighborhood amenities within walking distance not only benefit the health of residents, but also reduce traffic congestion. Walking trips to schools and recreation facilities replace automobile trips required with more separated land uses. The number and dispersal of such amenities is important to walkability. Neighborhood amenities must be strategically placed so that every resident has walking access to an amenity. Otherwise, distant amenities will be a futile attempt to create walkability.

DILWORTH



Dilworth - Parks and Civic Spaces

1. Church / Preschool
2. YMCA
3. Dilworth Elementary School
4. Tom Sykes Recreation Center
5. Church
6. Latta Community Center
7. Church / Preschool
8. Latta Park
9. Church
10. Church / Catholic School
11. Church
12. Church
13. The Red Cross

Source: Mecklenburg County, NC GIS

MYERS PARK



Myers Park - Parks and Civic Spaces

1. Edgehill Neighborhood Park
2. Church
3. Open Space
4. Church / Preschool
5. Church
6. Freedom Park
7. Myers Park Elementary School
8. Queens University
9. Church
10. Church / Preschool

Source: Mecklenburg County, NC GIS

McALPINE



McAlpine - Parks and Civic Spaces

1. Greenway access
2. Greenway access
3. Playground and greenway access

Source: Mecklenburg County, NC GIS

BIRKDALE VILLAGE



Birkdale Village - Parks and Civic Spaces

1. Town Center Park and Playground
2. Neighborhood Park

Source: Mecklenburg County, NC GIS

BAXTER VILLAGE



Baxter Village - Parks and Civic Spaces

1. Village Hall
2. Recycling Center
3. Church
4. Fort Mill Public Library
5. Daycare Center
6. YMCA
7. Orchard Park Elementary School
8. Community Center

Source: York County, SC GIS

PARKS

Parks and open space help facilitate social interaction, physical activity, and time spent outdoors. These areas also serve as a social center for community activities throughout the year. Parks come in many forms, such as greens, squares, and plazas that each serve their own purpose. The pictures to the right depict the many forms of parks within the case studies.

Streetcar suburbs often have neighborhood parks, such as Dilworth's Latta Park or Myers Park's Edgehill Park. Regional parks, such as Charlotte's Freedom Park, serve the city with larger green space and water features. Traditional neighborhood developments often have frequent pocket parks with playgrounds that draw children from nearby homes. Such pocket parks are common within Baxter Village.

Greenways are a growing form of open space that connect communities within a region with paved trails, often alongside streams. These trails are popular with walkers and pedestrians alike, and grant access to regional parks and other destinations. Myers Park, McAlpine, and Baxter Village all boast connections to regional greenway trails.

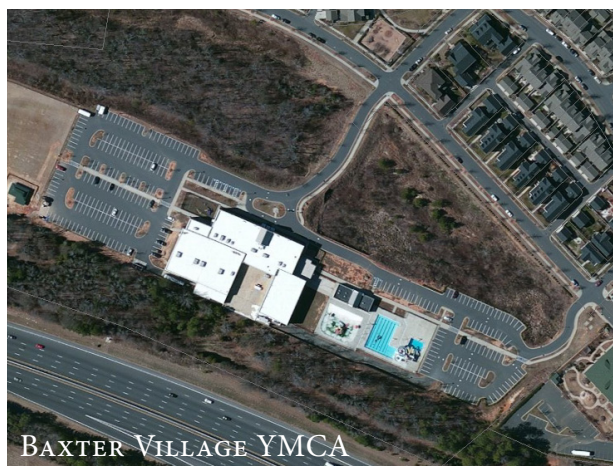


CIVIC SPACES

Civic spaces, such as a church, library, or town hall traditionally served as congregation places for the community. Such civic buildings were located on high ground at terminated vistas to show the building's importance. Today, civic placement remains important within New Urbanist communities, but is not a strong consideration elsewhere. The following examples depict different levels of walkability.

The Dilworth church and Myers Park church have high levels of walkability, with building placement close to the street and sidewalk connections. The Myers Park church has a prominent placement on a triangular lot where two streets intersect. Parking areas at both churches are adequate but not excessive, and are placed to the rear of the lot away from the main street. Finally, the churches are placed among residences, rather than being segregated to a highway.

The Baxter Village YMCA is less walkable than the other examples. The building is separated spatially from the residences, and requires a walk through either the woods or the parking lot to access the entrance. The substantial amount of parking located on either side of the building makes the YMCA a more auto-centric than pedestrian-friendly facility.



SCHOOLS



DILWORTH SCHOOL



MYERS PARK SCHOOL



BAXTER VILLAGE SCHOOL

Neighborhood schools promote healthier communities by encouraging children to walk or bike to school, and by serving the community's recreation needs during evenings and weekends. In addition to school placement within the community, building placement on the lot and other pedestrian elements affect walkability.

Dilworth Elementary School depicts both historical and more recent lot placement ideals. The original school building at the upper-left is placed at the street, while the new structure is set back from the street, with a bus loop to the rear. Tennis courts and a recreation field surrounding the school impede on its walkability from those directions, although sidewalk access exists at the southeast corner of the school.

Myers Park Elementary School is more walkable, with sidewalks accessing the street and parking hidden behind the school and homes. Like Dilworth, the recreation field provides similar walkability complications.

Orchard Park Elementary School in Baxter Village is the least walkable of the examples. Although direct sidewalk access exists to the adjacent neighbors to the west, parking lots impede walking from other directions. The school should also be placed in a central location that is accessible from all directions, rather than being on a lot that is adjacent to Interstate 77.

HUMAN SCALE

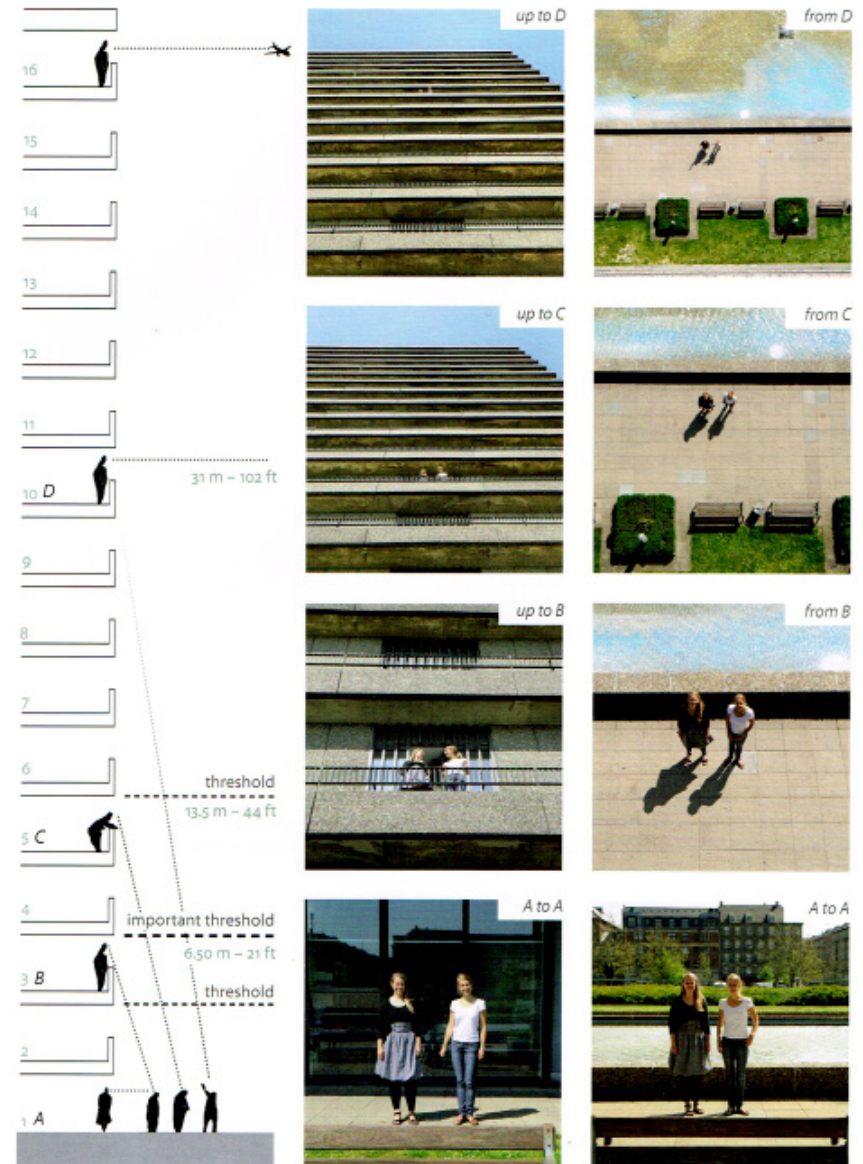
Buildings are key to defining and enclosing a space to create “outdoor living rooms” that serve the human preferences towards prospect and refuge. Prospect meaning a desirable view and refuge meaning a well-defined space. Outdoor living rooms are created when a central green space is surrounded by flat, simple building facades of at least three stories. These buildings are placed close to the street, with plentiful doors, windows, and awnings to welcome pedestrians and provide a sense of security via “eyes on the street.” Heights greater than two stories better define central open space, while creating a stronger street edge than low-lying structures. Building heights should also increase as the central green space enlarges to maintain the feeling of enclosure (Duany, Speck, & Lydon, 2010).

The figure to the right depicts the level of street interaction that is possible at variable building heights. Three stories serves as an optimal building height for both enclosure and social interaction. While five stories or greater may be necessary to enclose a large green space, street interaction is no longer possible due to the excessive distance between people. Semi-public attachments to front facades are also necessary to encourage social interaction from the street. These include balconies, porches and stoops on residential buildings, and awnings or arcades on commercial buildings (Duany, Speck, & Lydon, 2010).

The pictures on the opposite page depict the human scale of commercial nodes within the four neighborhoods that feature such land uses. The front view of the building is shown first, with a view upwards from the sidewalk shown second. All four neighborhoods contain buildings featuring balconies on upper floors that allow for interaction with the street and provide “eyes on the street.” The second Myers Park example depicts the limits of street interaction due to building height, proving Jan Gehl’s point about a height threshold in the figure to the right.

HUMAN-SCALE HEIGHT

senses and tall buildings



Source: Jan Gehl, *Cities for People*

DILWORTH



MYERS PARK



BAXTER VILLAGE



BIRKDALE VILLAGE



PEDESTRIAN ELEMENTS

While designing neighborhoods at a human scale is important, pedestrian affordances must also be included for walking comfort. These affordances create a shaded pathway, places to sit, places to lean, places for refuge, and places for social interaction.

The pictures to the right show pedestrian elements in the streetcar suburbs and traditional neighborhood developments. Since conventional suburbs are not designed at a human scale, pedestrian elements do not exist in McAlpine, and are not pictured.

Dilworth and Myers Park have a more limited variety of pedestrian elements, featuring mostly benches and sometimes a table near newer buildings. Myers Park's streetcar heritage remains in a stone seating area that is covered to protect waiting passengers.

Birkdale Village and Baxter Village offer many more pedestrian elements than the streetcar suburbs. Benches, tables, and chairs are found throughout the neighborhood, and are placed in attractive and comfortable locations. A water fountain is along the sidewalk in Baxter Village's town center. Awnings and building overhangs protect walkers from the weather, making window shopping a comfortable experience. Such small provisions mean a lot to pedestrians.

DILWORTH



MYERS PARK





ARCHITECTURAL DIVERSITY

Architectural diversity affects walkability as it creates visual interest that pedestrians value. Historically, architectural variance is due to climate, construction, and culture. Building vernacular tells the exciting story of a neighborhood's evolution in response to changes in society. Pedestrians appreciate these intricacies and the sense of place that develops over time.

Each neighborhood era offers a different approach to architectural diversity. Streetcar suburbs, such as Dilworth and Myers Park, have evolved over time to include a rich array of home styles, shapes, and sizes. Homes vary from modest bungalows to stately colonials to modern mansions along tree-covered streets.

Conventional suburbs, such as McAlpine, contain more homogeneous homes with less architectural detail than the streetcar suburbs. These “cookie cutter” homes are mostly auto-oriented with dominating garages and little or no space for the semi-public realm. For these reasons, McAlpine is not pictured in this section.

New Urbanism's design focus returns detail and semi-public elements to building facades. Homes are well-designed to vary in shape, size, and color which creates an attractive streetscape for pedestrians to enjoy. Birkdale Village and Baxter Village depict these features in the pictures to the left.

BIRKDALE VILLAGE

BAXTER VILLAGE

PARKING PLACEMENT

The amount, design, and placement of parking are important factors that affect the walkability of a neighborhood. Parking maximums and shared parking standards are key considerations in providing a limited amount of necessary parking. Parking design suggests the consideration of the quality of parking facilities, such as creating tree canopy or walking paths for surface parking. For structured parking, design suggests adding retail bays at street fronts, while adding shallow apartments or attractive facades on upper levels to create visual interest (Duany, Speck, & Lydon, 2010)

Placement of parking is crucial to walkability in that structured and surface parking that faces the street creates a dull streetscape that walkers seek to avoid. While thoughtful design is one solution, masking parking behind buildings is a better solution. The figures to the right show parking placement in Dilworth and Birkdale Village. Pedestrian-friendly parking is shaded in **green** and auto-centric parking is shaded in **red**.

In Dilworth, many small parking lots are located behind historic homes, while a few surface lots exist that border the street. Birkdale Village's town center demonstrates structured parking which is wrapped with buildings containing street-level retail. Unfortunately, a large portion of the town center remains auto-centric with large surface lots that face the street. Pictures of these parking designs are shown on the opposite page.

Residential parking placement also affects walkability. Streetcar suburbs often provide on-street parking that buffers pedestrians from traffic flow. Conventional suburbs moved parking to the lot in the form of frontloaded garages and wide driveways facing the street. New Urbanism innovated parking placement by providing both on-street parking and rear garages facing alleys. This way, doors and windows welcome social interaction rather than rejecting pedestrians as garages and driveways do. Pictures of various parking placements are seen on the opposite page.

DILWORTH



BIRKDALE VILLAGE



COMMERCIAL PARKING

STREETCAR SUBURB



NEW URBANISM



RESIDENTIAL PARKING

STREETCAR SUBURB

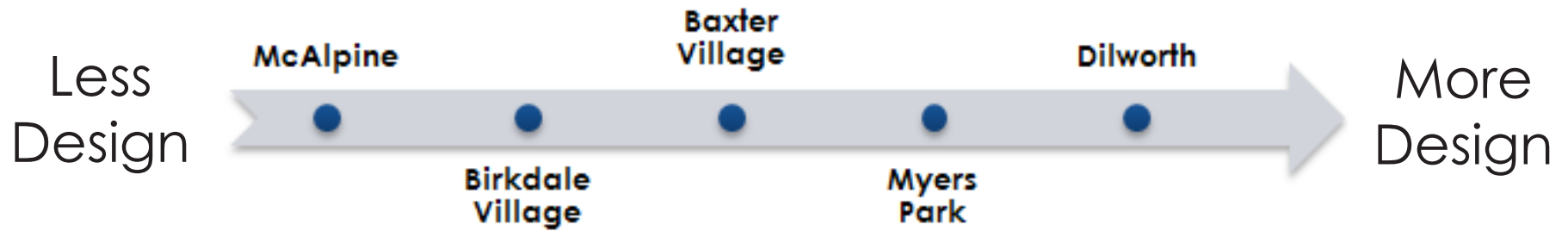


CONVENTIONAL SUBURB



NEW URBANISM





DILWORTH

Dilworth performs best with an array of neighborhood amenities, which are designed with a pedestrian orientation. Since it was developed prior to the automobile, a pedestrian focus is inherent in Dilworth's design. This focus has been retained over time with new development. Parks are enclosed by mature trees and homes, while newer mid-rise apartments fit the human scale of the neighborhood. Architectural diversity is also a benefit of incremental changes over time. Finally, parking is placed most often behind homes to create a vibrant streetscape.

MYERS PARK

Myers Park has similar characteristics to Dilworth, as it was developed prior to automobile domination. As such, there are many neighborhood amenities and homes that are built to the human scale. Both Freedom Park and the Sugar Creek Greenway border Myers Park. Homes feature diverse architecture due to historical design standards and continued affluence over time. Parking is also provided on-street or to the rear of homes and businesses, except along the neighborhood fringe.

BAXTER VILLAGE

Baxter Village demonstrates New Urbanism's focus on design and the human scale. It features multiple neighborhood amenities including an array of pocket parks, a school, and a library. While these amenities could be better placed to enhance walkability, their existence in the community is more critical. The neighborhood succeeds in providing a stronger sense of enclosure and architectural diversity than Birkdale Village. The town center is well-designed with various pedestrian elements; however, has excessive surface parking that faces the street.

BIRKDALE VILLAGE

While Birkdale Village's town center offers many pedestrian-friendly elements, it is hard to reconcile the neighborhood's lack of amenities. Furthermore, its parks pale in dispersion and design when compared to Baxter Village, although they bring a sense of enclosure. Residential architecture appears more suburban and bland compared to Baxter Village. The neighborhood also has mixed performance in parking placement, featuring both wrapped parking and street-front surface parking. While Birkdale Village is certainly more walkable than McAlpine, the other case studies are stronger performers.

MCALPINE

Conventional suburbs are clear losers across the board in this category. While McAlpine has a greenway along its perimeter, there are no civic uses or schools within the neighborhood. The small park within the neighborhood has minimal features that are not child-friendly. Private backyards replace public parks, and low-lying homes offer no sense of enclosure. McAlpine has fairly homogeneous homes with front garages that dull the streetscape. Clearly, this neighborhood was designed with the automobile in mind, and not the pedestrian.

6

Design: Streets and Enclosure



The design of the streets and the public realm complements the design of the buildings and the private realm that were described in the previous chapter. Contrary to popular thought, the street is not only for traffic flow, but also serves as a public space. As a result, streets require elements such as sidewalks, trees, and lights to be successful. Moreover, complete streets are necessary to accommodate all transportation modes, including pedestrians and bicycles. While each street is unique, common elements must exist to encourage walking over driving. This chapter will examine streets and the public realm from both aerial and human perspectives.

First, we will compare neighborhood streets from an aerial perspective to understand intersection density, street connectivity, and block size. Research has shown that street intersection density is one of the most important elements of the built environment that contributes to reduced vehicle miles traveled (Ewing and Cervero, 2010). These factors affect the distance and choices of pedestrian trip routes.

Second, we will compare neighborhoods from a human perspective to analyze street and sidewalk characteristics. We will discuss various street designs that are found throughout the neighborhoods by looking at Charlotte's Urban Street Design Guidelines. Pedestrian level of service

(LOS) will be reviewed in the case studies using Charlotte's LOS methodology. Other important aspects such as sidewalk widths and street tree cover will also be topics in this chapter.

Finally, we will return to an aerial view, using figure-ground maps to compare neighborhood enclosure. Building setbacks and heights, as well as tree canopy are primary elements of neighborhood enclosure. I will focus on building setbacks and tree cover to measure the spatial enclosure of the case studies. Every element works together to affect one's perceived comfort and safety of walking through the neighborhood.

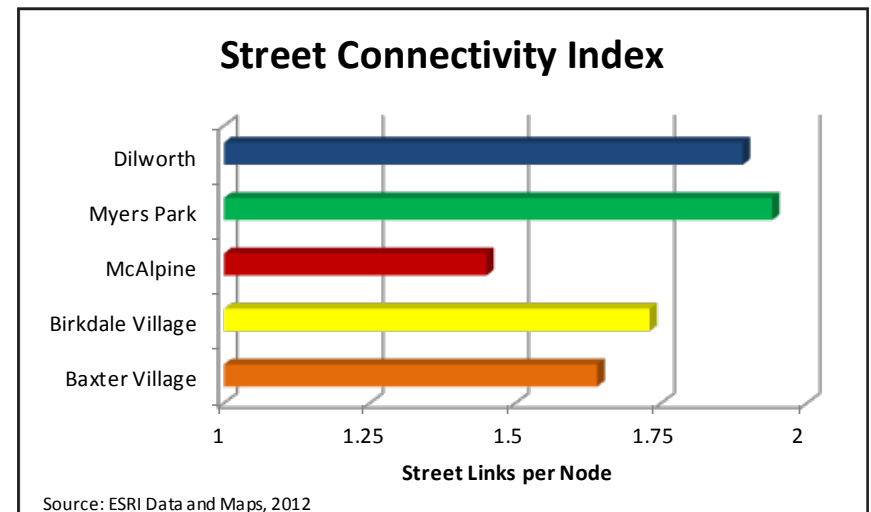
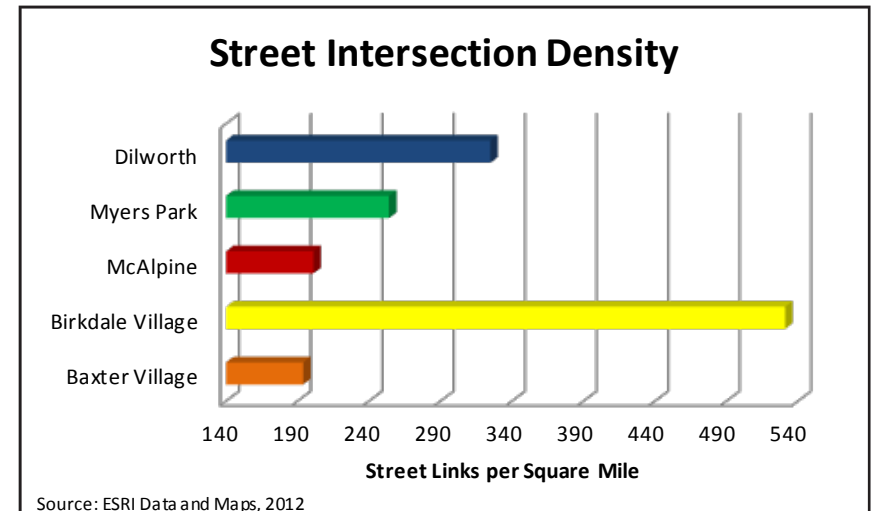
INTERSECTION DENSITY AND CONNECTIVITY

Intersection density is one of the most important elements of the built environment that reduces vehicle miles traveled. In fact, a doubling of intersection density increases walking by about 44 percent (Ewing and Cervero, 2010). A well-connected street system serves pedestrian needs by providing a more direct path and a choice of routes. This way, walking trips are quicker and more interesting. Connectivity has a direct relationship with the number of intersections, so neighborhoods with small blocks have greater connectivity than those with large blocks. Walkability can be further enhanced by providing mid-block connections for pedestrians through open space corridors. In conclusion, the more street intersections per square mile, the tighter the mesh of streets, providing a better walking environment (Campoli, 2012).

Street intersection density standards for LEED-ND accreditation include a minimum of 140 intersections per square mile, with a preference for at least 300 intersections per square mile (United States Green Building Council, 2013). As seen in the chart to the upper right, only Dilworth and Birkdale Village meet preferred criteria. The chart to the lower right shows street connectivity in street links per node, where 1.00 is a cul-de-sac, while 2.00 is four-way intersection. As expected, McAlpine has the lowest street connectivity, while Myers Park and Dilworth have the highest connectivity.

The figures on the following pages depict street intersections within the case studies. Birkdale Village, Dilworth, and Myers Park have the tightest street networks, while McAlpine has a loose network of “loops and lollipops.” Baxter Village performs moderately well, with few intersections, but high connectivity at those intersections. As expected, the streetcar suburbs and traditional neighborhood developments all outperform the conventional suburb.

NEIGHBORHOOD COMPARISON



STREET DIVERSITY

Streetscape is a critical element in neighborhood walkability, but has greater complexity and is harder to measure than other elements. Features that make up the streetscape include sidewalks, street trees, crosswalks, and benches. The width and number of streets and sidewalks are also important measures that affect walkability of the streetscape (Campoli, 2012). I will first examine the diversity of streetscapes within the neighborhood case studies, then focus on individual elements of the streetscape that are most valuable to walking, such as sidewalks and street trees.

A well-calibrated street creates bands of speed which increase towards its center. Storefronts and tables are placed along the edges for foot traffic, with bike lanes placed just beyond the curb, and automobile lanes placed through the center of the street (Campoli, 2012). Sidewalks should widen with pedestrian activity, with on-street street parking serving as a buffer between pedestrians and automobiles.

Charlotte's Urban Street Design Guidelines are valuable for analyzing street diversity. The descriptions and figures to the right detail street designs found within the case studies. Figures on following pages map street designs that are available within each neighborhood, with actual measures of unique streets in tables. Finally, pictures of existing street designs in the neighborhoods visualize such measures.

Dilworth and Myers Park have the greatest street diversity, combining historically narrow streetscapes with incremental changes over time. Birkdale Village and Baxter Village have less diversity, but offer narrow streets similar to the streetcar suburbs. McAlpine has the least street diversity, with wide residential streets that lack on-site parking. This combination leads to greater traffic speeds and less pedestrian safety. As a result, McAlpine is the least walkable neighborhood in this regard.

STREET DESIGN TYPES

MAIN STREET: Pedestrian-scaled and people-oriented to serve as centers of civic, social, and commercial activity. These streets are primarily found in older neighborhood centers or new pedestrian-oriented developments. Attractive buildings are placed close to the street, with windows and doors fronting the sidewalk for pedestrian activity.

LOCAL RESIDENTIAL: Provides direct access to homes and neighborhood amenities, and are particularly important to the quality of life of the neighborhood. These streets are designed to provide a comfortable walking, cycling, and living setting.

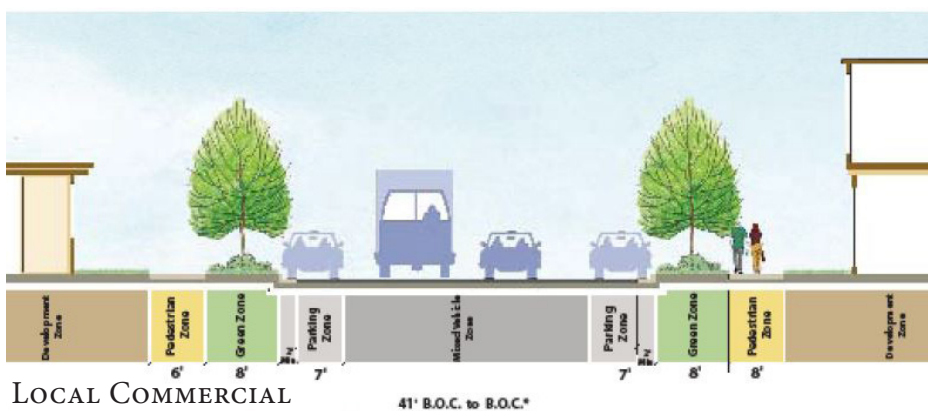
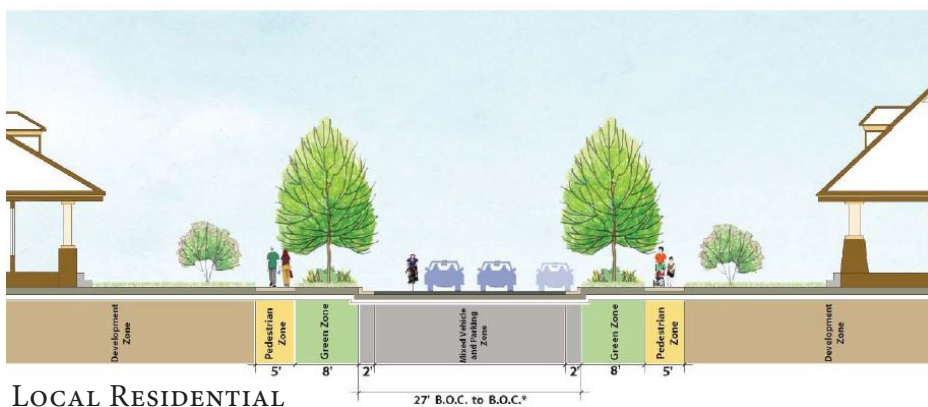
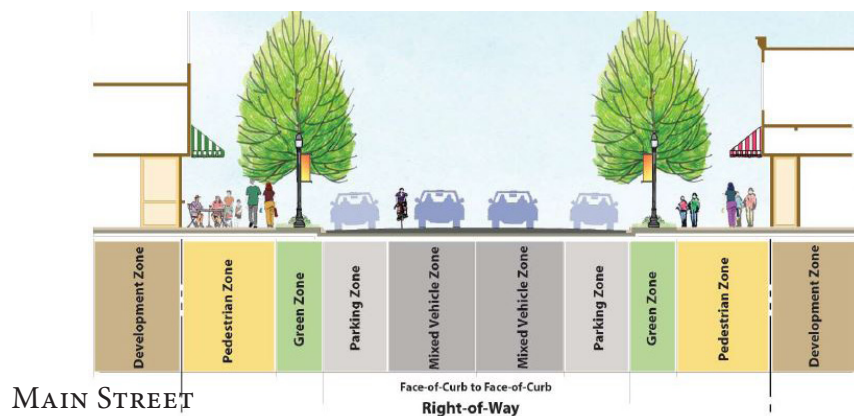
LOCAL COMMERCIAL: Serves office and retail uses, and accommodates all transportation modes. Street treatments for pedestrians and bicycles in mixed traffic are expected in this design.

AVENUE: Serves a variety of functions, making them the most common street design. They provide access between residential and commercial areas, connect areas of the city, and sometimes traverse neighborhoods. Avenues are designed to accommodate high levels of pedestrian, bicycle, and automobile traffic. They provide high mobility for the automobile, but with greater comfort for alternative modes of transportation.

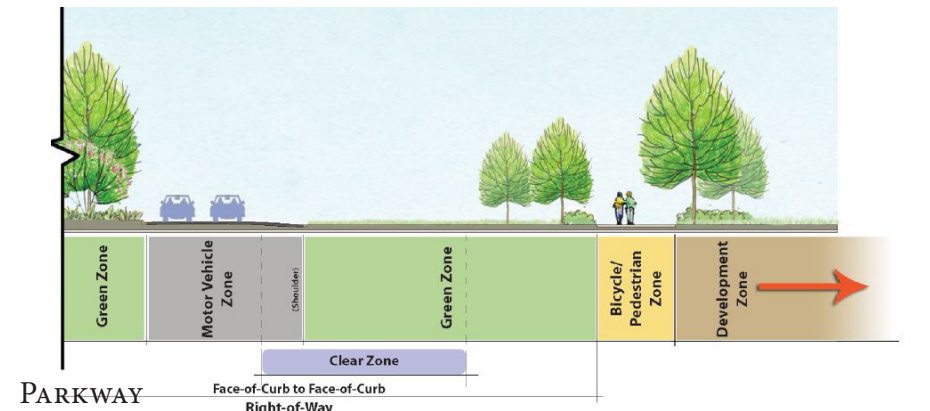
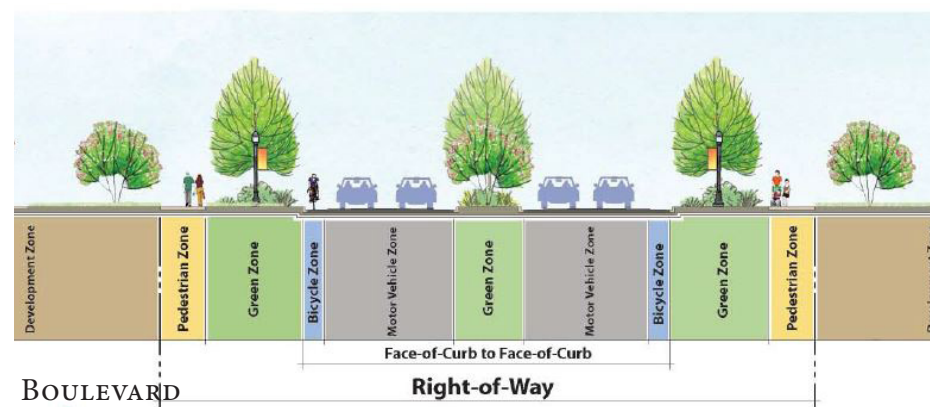
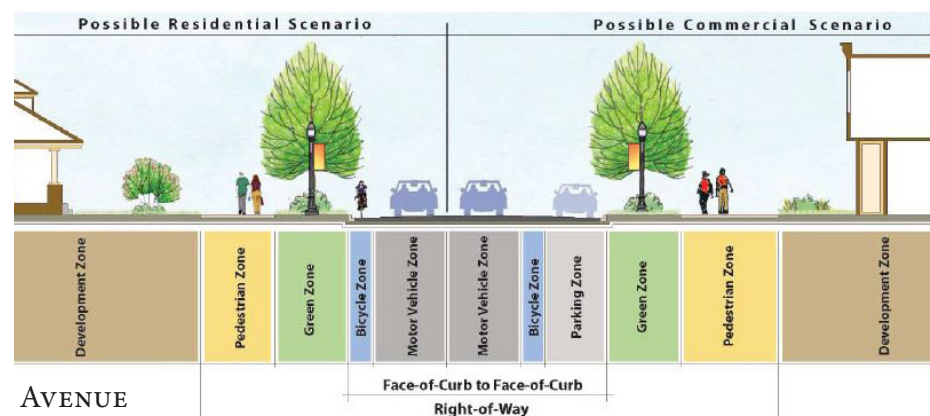
BOULEVARD: Boulevards are designed to move a large number of vehicles between different parts of the city, and connect smaller streets to the network. The modal priority is the automobile, although accommodations are still made for pedestrians and bicycles.

PARKWAY: The parkway's primary function is to move high traffic volumes between different parts of the city, which makes it the most auto-centric street design. Traffic flows at high speeds along limited-access corridors, with pedestrian activity being oriented elsewhere.

PEDESTRIAN-ORIENTED

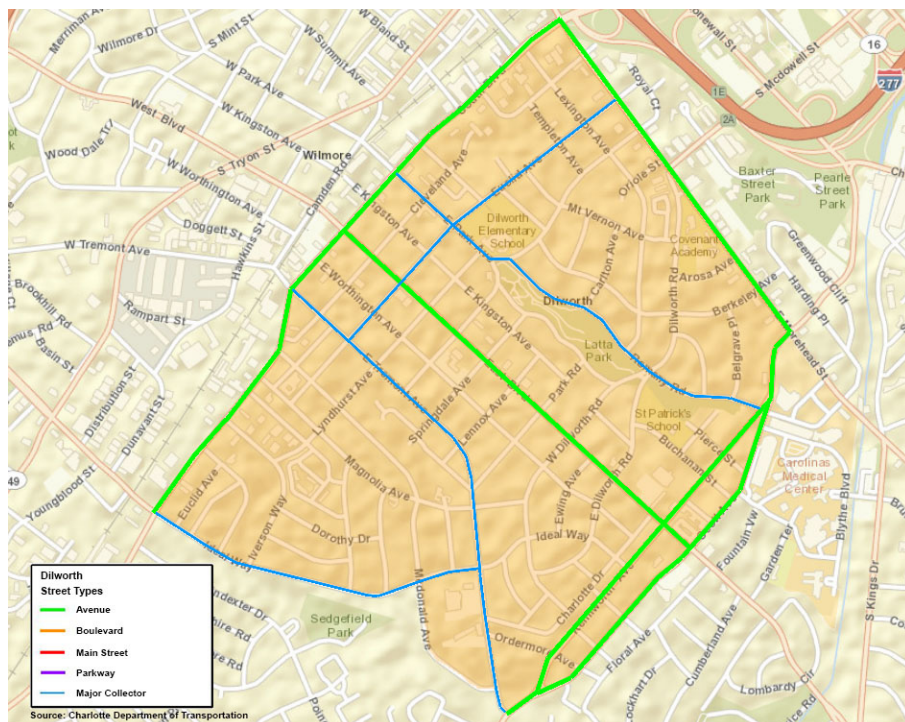


AUTO-ORIENTED



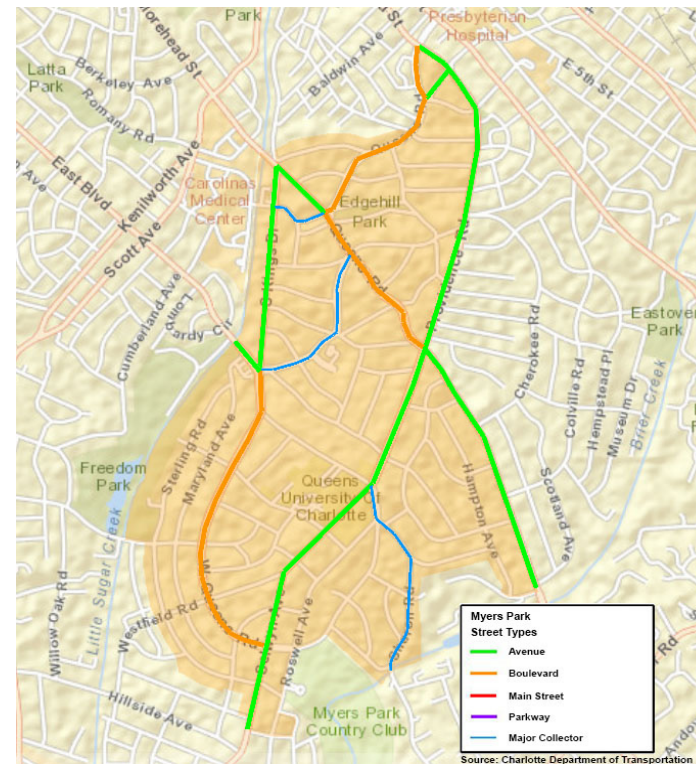
Source: Charlotte Urban Street Design Guidelines, 2007

DILWORTH



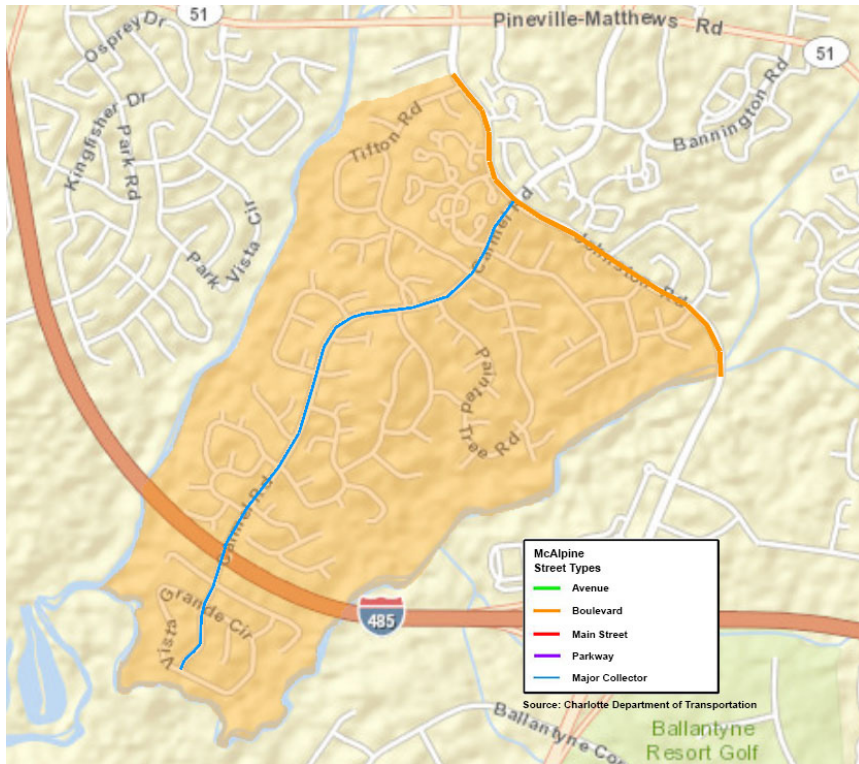
STREET NAME	STREET TYPE	WIDTH RANGE	AUTO LANES	BIKE LANES	PARKING LANES
E. Morehead Street	Avenue	50'	4	0	0
South Boulevard	Avenue	38'-70'	4	0	2
East Boulevard	Avenue	68'	2 or 3	2	2
Kenilworth Avenue (1-way)	Avenue	30'	2	1	1
Euclid Avenue	Collector	24'-34'	2	0	2
E. Park Avenue / Romany Road	Collector	20'-36'	2	0	1 or 2
E. Tremont Avenue	Collector	28'	2	2	2
Ideal Way	Collector	24'-30'	2	0	0
McDonald Avenue	Residential	24'-28'	2	0	2
E. Kingston Avenue	Residential	24'-36'	2	0	2
Lyndhurst Avenue	Residential	24'-26'	2	0	2

MYERS PARK



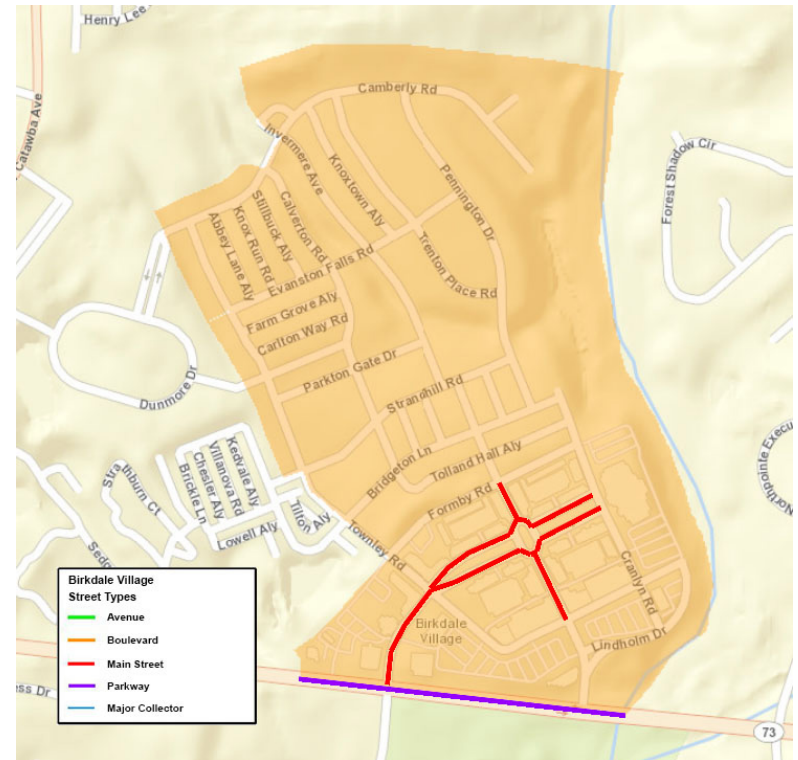
STREET NAME	STREET TYPE	WIDTH RANGE	AUTO LANES	BIKE LANES	PARKING LANES
Queens Road	Boulevard	70'	4	0	0
Providence Road	Avenue	44'	4	0	0
S. Kings Drive	Avenue	44'-55'	4	0	0
Selwyn Avenue	Avenue	32'-40'	2 or 3	0	2
Sharon Road	Collector	20'	2	0	0
Queens Road E.	Collector	26'-36'	2	0	1 or 2
Maryland Avenue	Residential	24'-28'	2	0	2
Sherwood Avenue	Residential	22'	2	0	2
Hampton Avenue	Residential	24'	2	0	2

McALPINE



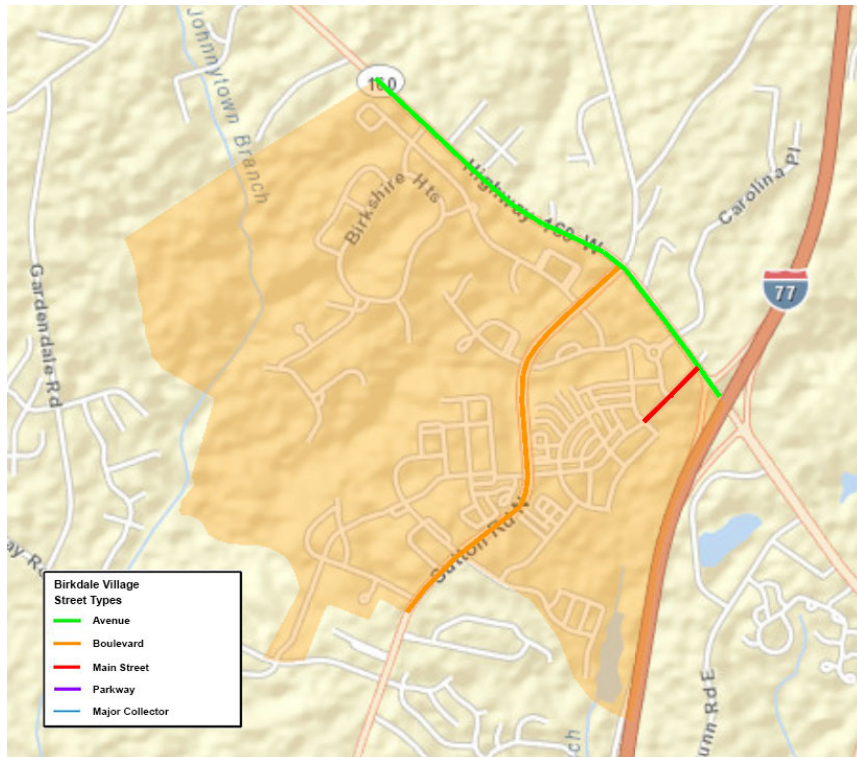
STREET NAME	STREET TYPE	WIDTH RANGE	AUTO LANES	BIKE LANES	PARKING LANES
Johnston Road	Boulevard	60'-70'	4	0	0
Carmel Road	Collector	26'-76'	2	2	0
Painted Tree Road	Residential	32'	2	0	2
Five Cedars Road	Residential	25'	2	0	2
Winding Way Road	Residential	22'	2	0	0

BIRKDALE VILLAGE



STREET NAME	STREET TYPE	WIDTH RANGE	AUTO LANES	BIKE LANES	PARKING LANES
Sam Furr Road	Parkway	86'-88'	5	1	0
Birkdale Commons Parkway	Main Street	68'-80'	2	0	4
Lindholm Drive	Commercial	22'-60'	2 or 4	0	2
Townley Road	Residential	22'-45'	2	0	2
Camberly Drive	Residential	18'	2	0	2
Pennington Drive	Residential	22'-25'	2	0	2

BAXTER VILLAGE



STREET NAME	STREET TYPE	WIDTH RANGE	AUTO LANES	BIKE LANES	PARKING LANES
Steele Creek Road	Avenue	60'-76'	4	0	0
Sutton Road	Boulevard	72'-75'	4	0	0
Market Street	Main Street	25'-38'	2	0	2
Springmaid Avenue	Residential	26'	2	0	1
Richard's Crossing	Residential	25'-30'	2	0	1
Colonel Springs Way	Residential	25'-36'	2	0	2

PICTURES OF STREET DIVERSITY



BLOCK SIZE

Block size is a key driver of intersection density and its impacts on walkability. As mentioned earlier, a grid of streets with small blocks offers a direct path and a greater choice of routes than large blocks. In addition, rectilinear blocks have more connectivity than curvilinear networks. Finally, mid-block connections also provide safe routes away from traffic and better access to pedestrians (Campoli, 2012).

Block size standards set forth in the LEED-ND Rating System give light to my case study neighborhoods' walkability. The standards set a maximum block length of 450 feet, with a maximum block perimeter of 1,500 feet (United States Green Building Council, 2013). Block area standards are not given in the rating system; however, less area is preferred.

The figures to the right compare block size among the case studies. Block perimeter and block area are based on census block data, while block lengths are retrieved from Walk Score. The typical block perimeter chart excludes outliers to show a more accurate perimeter range.

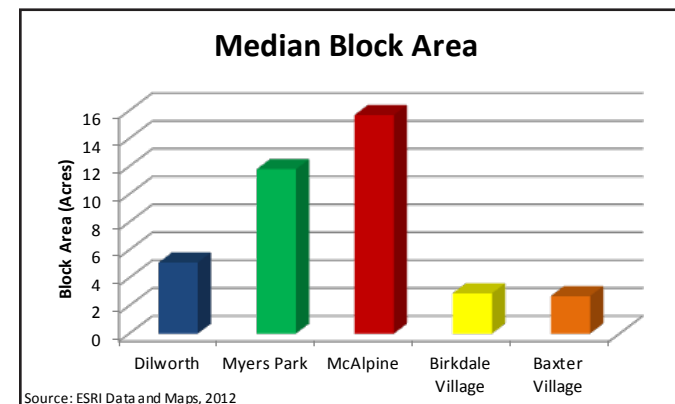
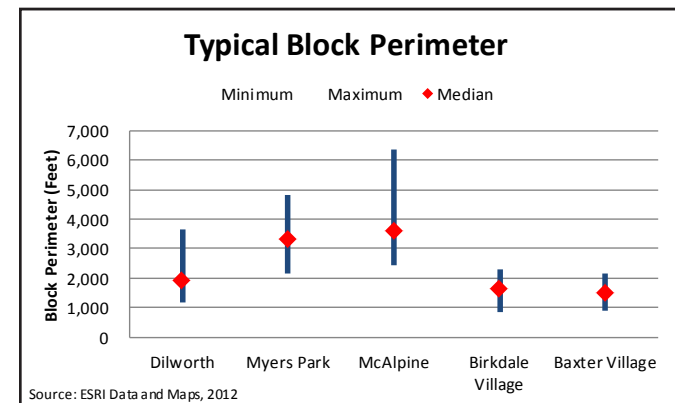
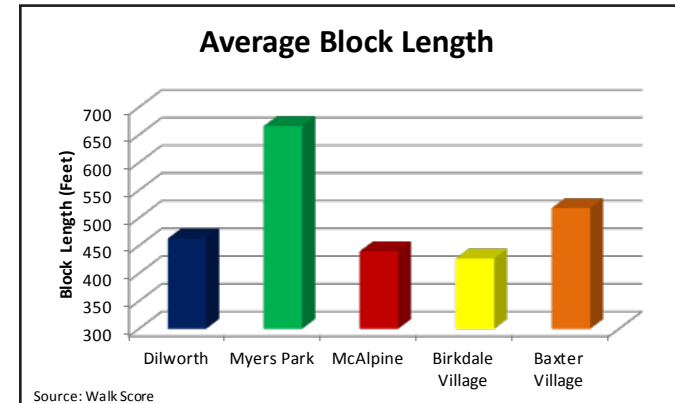
Dilworth, McAlpine, and Birkdale Village have average block lengths near 450 feet, while Myers Park has the highest block length at 666 feet. Baxter Village has a moderate average block length of 518 feet.

Birkdale Village and Baxter Village have median block perimeters near 1,500 feet, while Dilworth has many blocks that are under this measure. Both Myers Park and McAlpine have perimeter ranges that start significantly above 1,500 feet and go far beyond the LEED-ND maximum.

While no standard exists for block area, a stark contrast exists among the neighborhoods. Baxter Village, Birkdale Village, and Dilworth have median block areas of five acres or less, while McAlpine and Myers Park have median block areas exceeding ten acres.

In summary, New Urbanism performs best overall in block size.

NEIGHBORHOOD COMPARISON



PEDESTRIAN LEVEL OF SERVICE

Historically, street quality and performance have been measured using a level of service (LOS) method that applies LOS grades based on criteria set forth in The Highway Capacity Manual. Such criteria have been adapted in Charlotte to provide measurements of pedestrian level of service at street intersections. Six elements are analyzed when determining pedestrian LOS:

1. Crossing distance
2. Signal phasing and timing
3. Corner radius
4. Right-turn-on-red
5. Crosswalks
6. Traffic flow direction

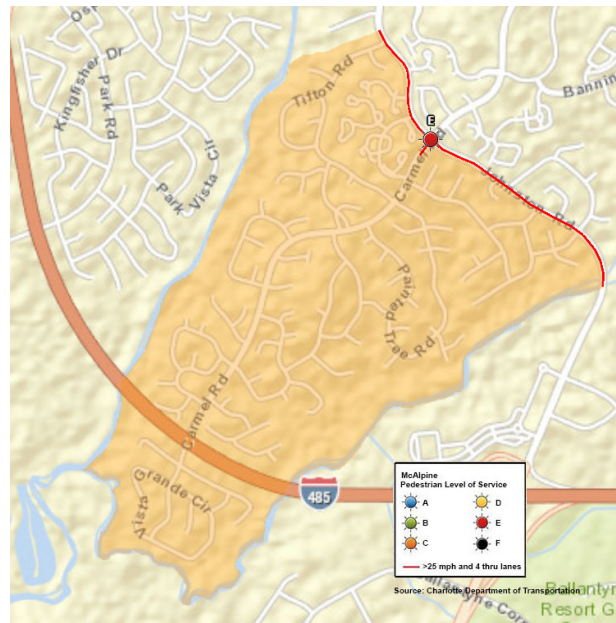
Points are awarded based on the existence of specific features at street intersections. Grades from A (most pedestrian friendly) to F (least pedestrian friendly) are based on point totals (Steinman and Hines, 2003).

Pedestrian LOS data and pictures are shown to the right for the Dilworth, Myers Park, and McAlpine neighborhoods. Dilworth intersections meet grades A and B inside the neighborhood, and C along boundary streets. Myers Park LOS grades are in the B to C range, although these are mostly border streets. McAlpine performs poorly at the neighborhood's main entrance, which is at LOS grade E.

LOS: A-



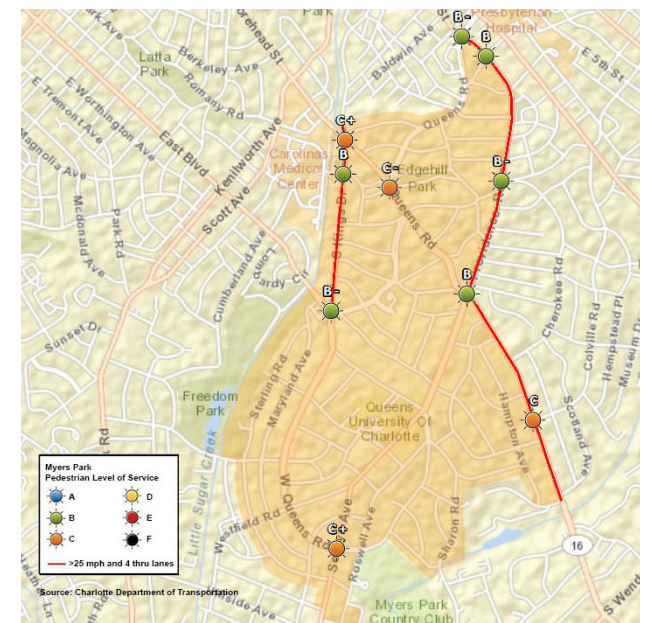
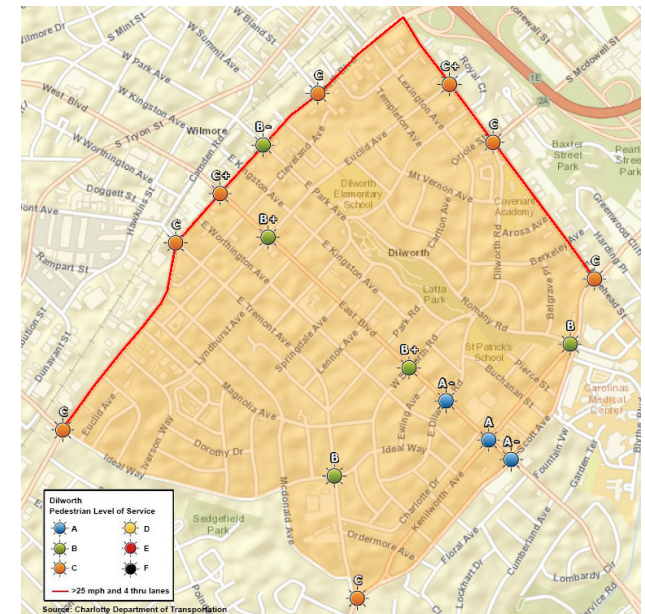
LOS: B



LOS: C



LOS: E



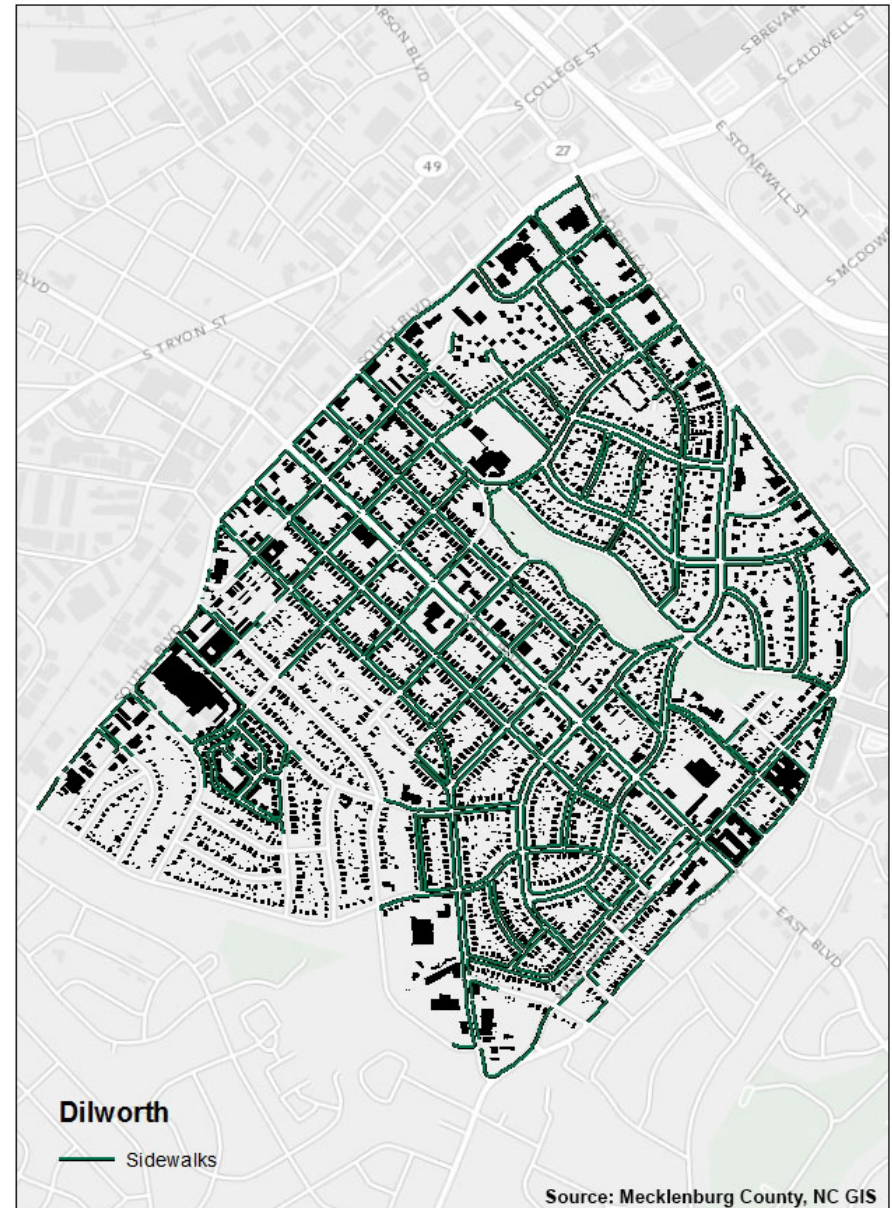
SIDEWALKS

Sidewalks are the lifeblood of a walkable neighborhood. They provide safe and comfortable paths to traverse that are specifically designed for the pedestrian. Sidewalk availability and width must be considered when looking at a neighborhood streetscape. Sidewalks should be available on both sides of the street to prevent unnecessary, and possible dangerous crossing.

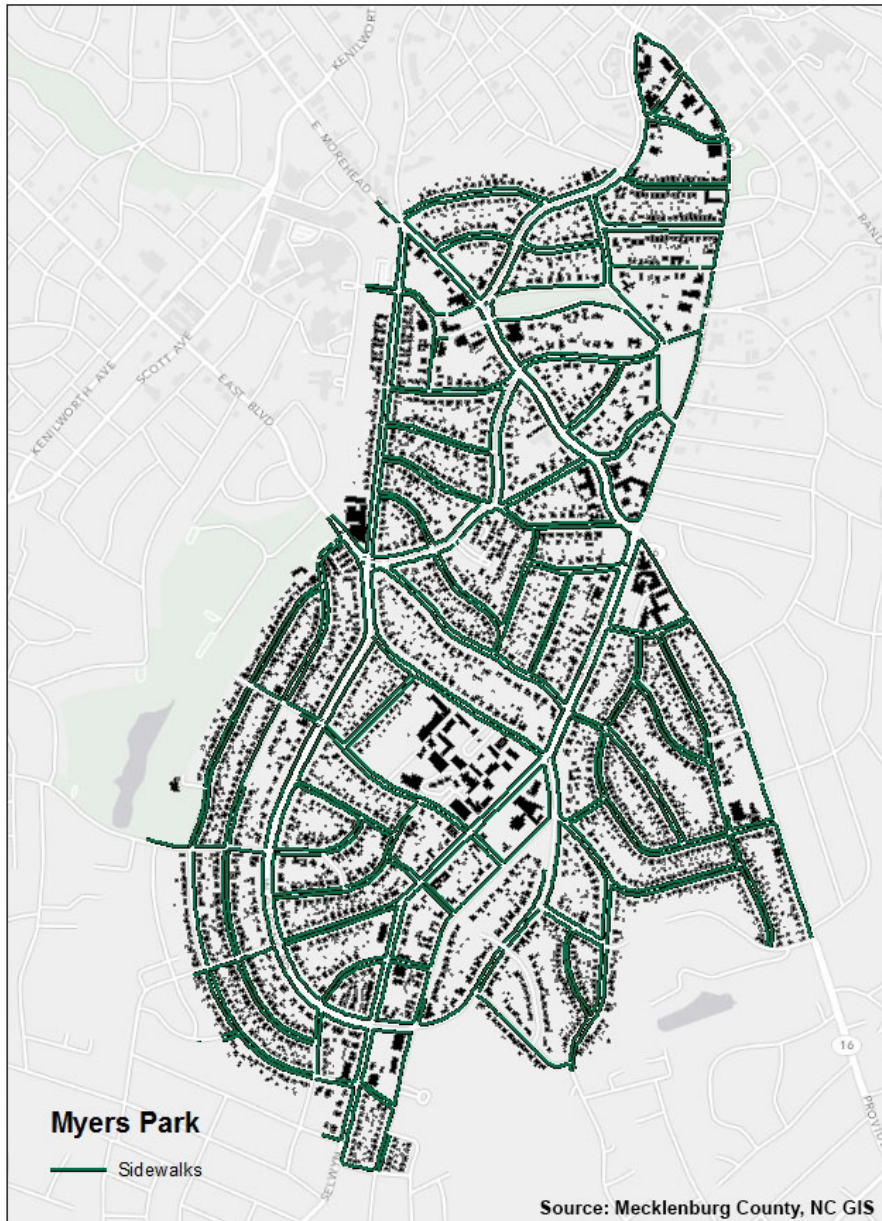
Sidewalks widths vary, depending on the surrounding land uses. Commercial corridors require wider sidewalks to accommodate seating and higher levels of foot traffic. Residential areas are more amenable to narrow sidewalks, depending on use. LEED-ND standards suggest sidewalks along both sides of at least 90 percent of streets, with widths of at least eight feet for commercial uses and four feet for residential uses (United States Green Building Council, 2013).

The following figures depict sidewalk availability in neighborhoods where GIS data is available. Dilworth and Myers Park have sidewalks on both sides of the majority of their streets, while McAlpine has no sidewalks within its residential areas. New Urbanist communities such as Birkdale Village and Baxter Village take pride in their sidewalks, and would meet the LEED-ND criteria above. The table below compares sidewalk widths among the neighborhood case studies.

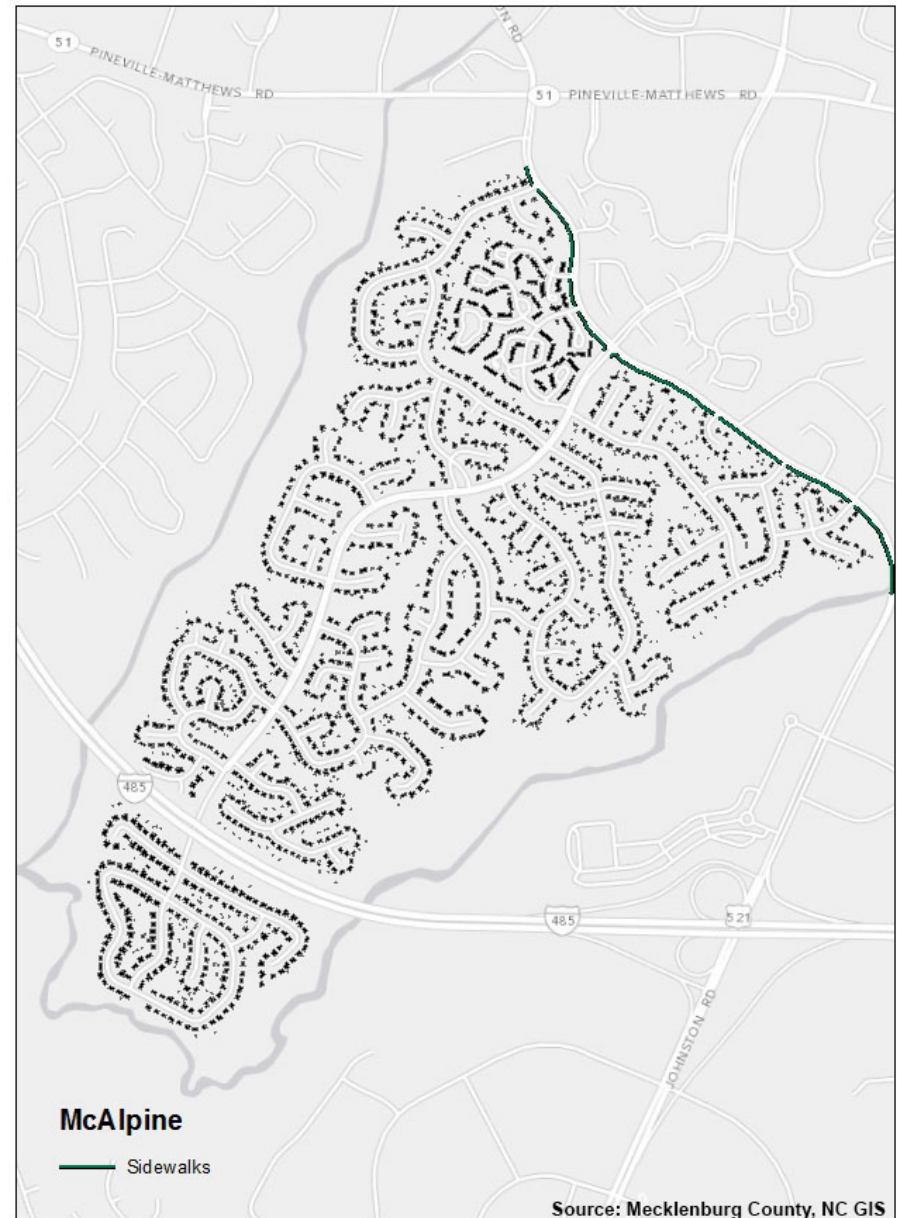
NEIGHBORHOOD	NARROW WIDTH	TYPICAL WIDTH	WIDE WIDTH
DILWORTH	4'	5'	11'
MYERS PARK	4'	5'	8'
MCALPINE	N/A	N/A	N/A
BIRKDALE VILLAGE	5'	6'	11'
BAXTER VILLAGE	5'	6'	16'



MYERS PARK



McALPINE



NARROW WIDTH

TYPICAL WIDTH

WIDE WIDTH

DILWORTH



MYERS
PARK



BIRKDALE
VILLAGE



BAXTER
VILLAGE



TREES

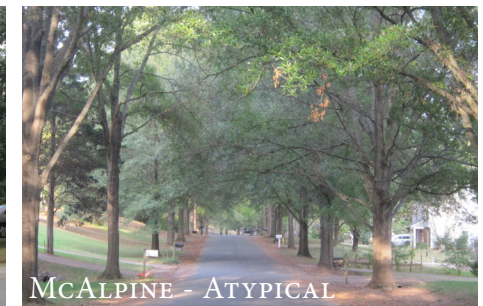
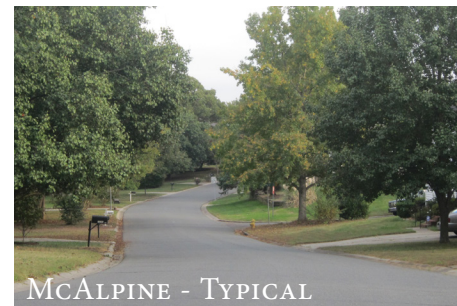
Trees offer numerous benefits to neighborhood walkability. Mature tree canopy creates a sense of enclosure when used with tight building setbacks. The resulting outdoor room is attractive to pedestrians. A large canopy is also aesthetically pleasing, adding a natural element to an urban landscape. The sights and sounds of squirrels and birds are a respite from office cubicals and car horns. Finally, trees are essential to provide pedestrians shade from the hot summer sun. Seats in the shade are very popular places to relax and read or enjoy ice cream in the summer.

Trees are a critical part of the streetscape, and are often found in urban street design standards. LEED-ND Rating System standards require street trees to be placed at intervals averaging no more than 40 feet on both sides of the street (United States Green Building Council, 2013). The table to the right shows that Birkdale Village and Baxter Village meet these criteria, while McAlpine fails to provide a streetscape for street trees. Dilworth and Myers Park boast mature tree canopy, but determining a street tree interval is difficult.

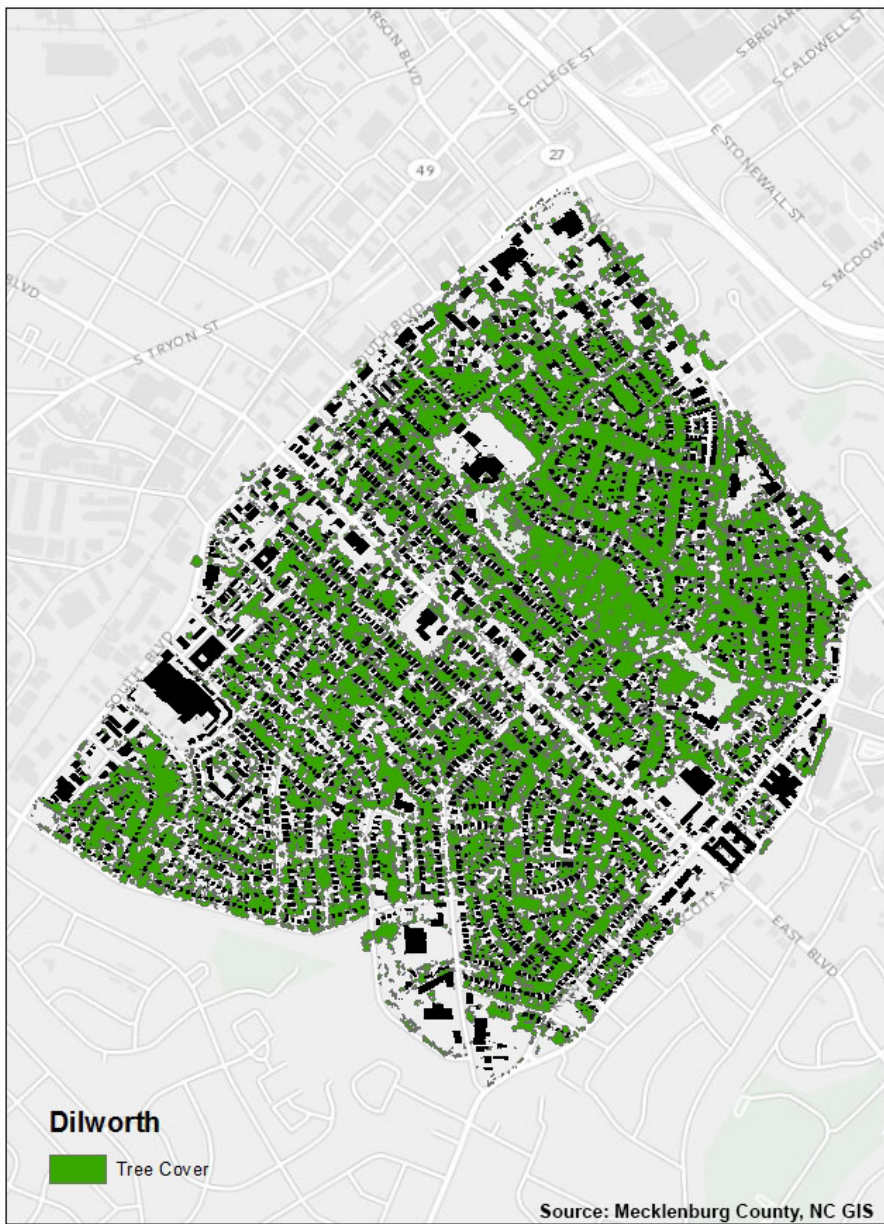
Pictures to the right show tree cover within the case studies, with aerial imagery of tree cover being provided through GIS on the following pages. Tree canopy enclosure in Dilworth and Myers Park is tight along residential streets, but more loose along commercial corridors. McAlpine has tight canopy along the greenway perimeter, but no canopy along many residential streets. Birkdale Village has the most canopy along its borders and in open space, but little canopy along residential streets. This can be attributed to the young age of its street trees, which are placed at a frequent interval that will provide great canopy in the future as they mature. Baxter Village tree cover GIS data is not available, but would be similar to Birkdale Village.

STREET TREES

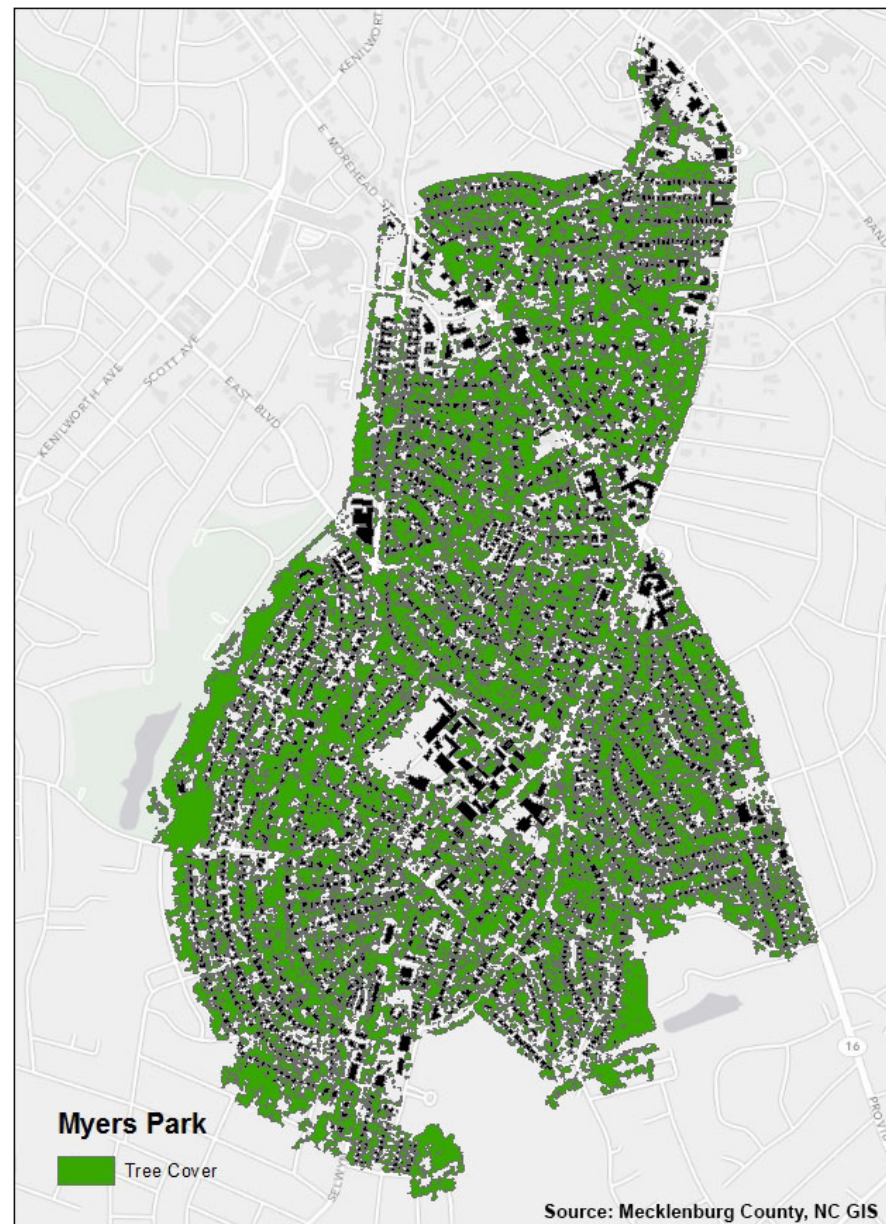
NEIGHBORHOOD	STREET TREE FREQUENCY
DILWORTH	Variable tree spacing
MYERS PARK	Variable tree spacing
MCALPINE	40'-50' tree spacing along only a few streets
BIRKDALE VILLAGE	20' tree spacing along most streets
BAXTER VILLAGE	25'-30' tree spacing along most streets



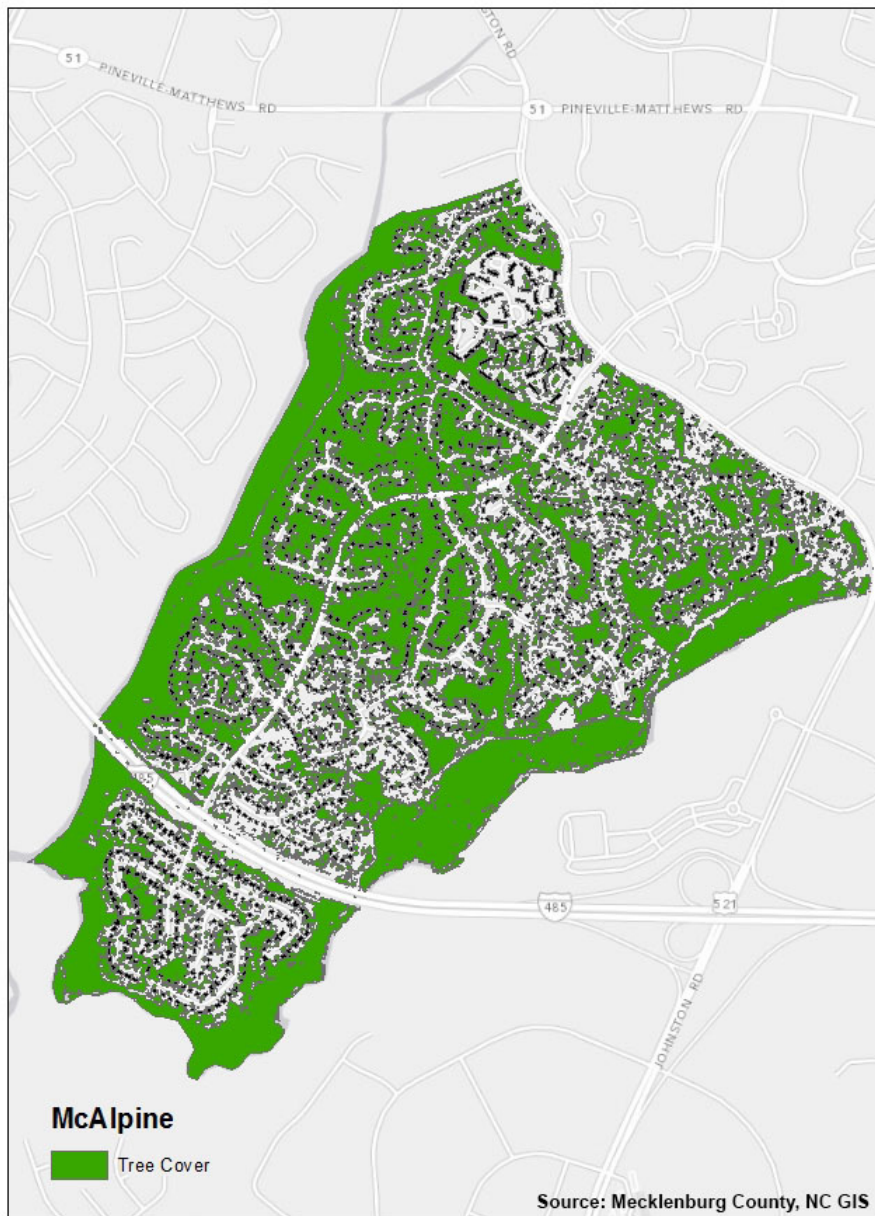
DILWORTH



MYERS PARK



McALPINE



BIRKDALE VILLAGE



ENCLOSURE

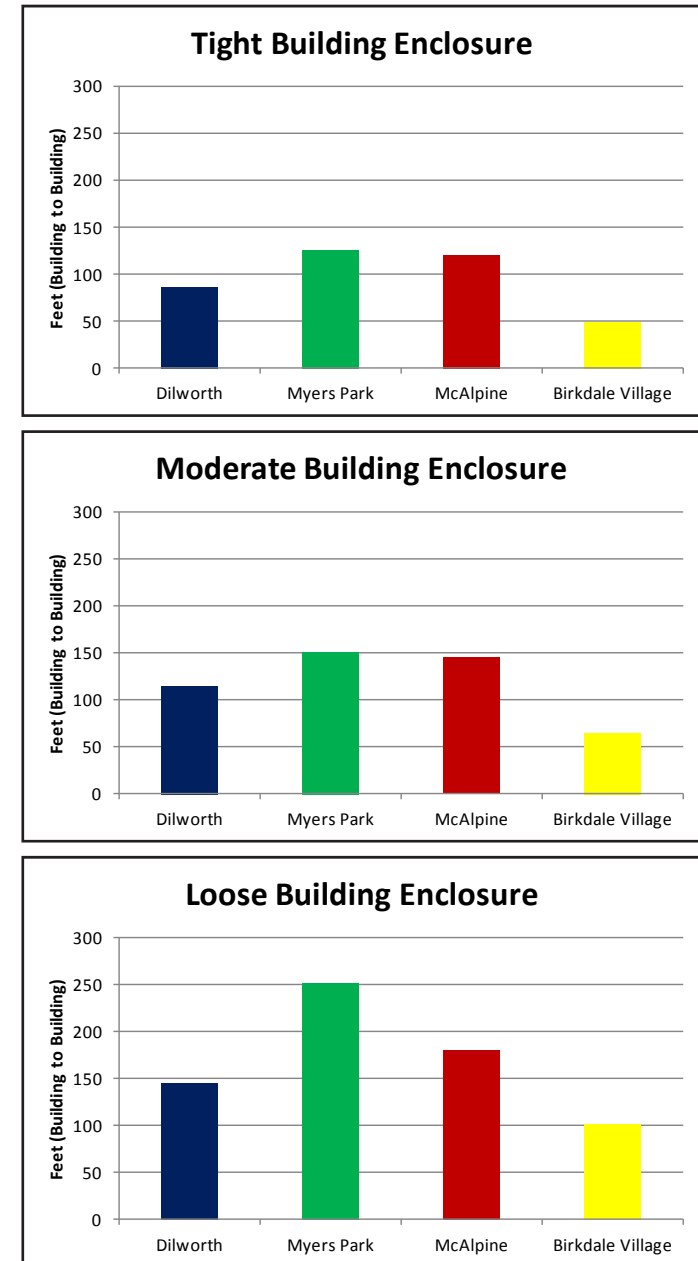
Enclosure is the definition of space by surrounding structures, which create a permeable wall that is appealing to pedestrians. The amount of enclosure is a product of both vertical and horizontal aspects of building design. The vertical aspect considers the ratio of building height to street width, while the horizontal aspect considers building setbacks from the street. My research will measure only the horizontal aspect of spatial enclosure through building setbacks. An excerpt of the LEED-ND Rating System for measuring setbacks is listed below:

1. At least 80 percent of the total linear feet of street-facing building facades in the project is no more than 25 feet from the property line.
2. At least 50 percent of the total linear feet of street-facing building facades in the project is no more than 18 feet from the property line (United States Green Building Council, 2013).

Enclosure is best depicted using figure-ground maps, which are shown for Dilworth, Myers Park, McAlpine, and Birkdale Village on the following pages. Black imprints represent building footprints, while gray represents yards, streets, and open space. These areas are well-defined when building enclosure is tight, yet ambiguous with loose enclosure. From a pedestrian's standpoint, a well-defined space creates an outdoor room and provides a sense of refuge that walkers appreciate.

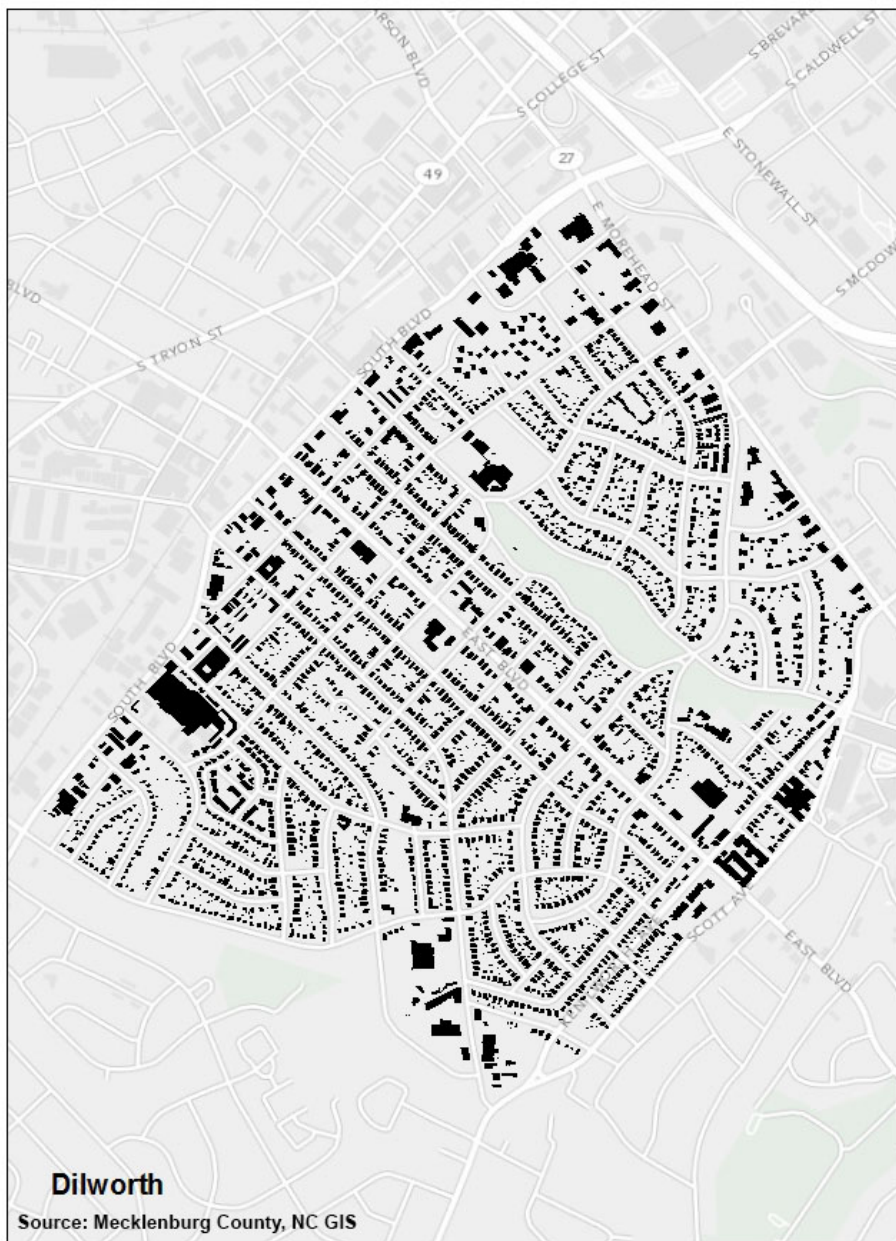
The figures to the right compare building enclosures among the case studies. While none of the case studies meet LEED-ND criteria, Birkdale Village and Dilworth have the tightest overall enclosure, while Myers Park and McAlpine have the loosest overall enclosure. Baxter Village is not included in this section due to a lack of building footprint data; however, it has similar enclosure to Birkdale Village.

NEIGHBORHOOD COMPARISON

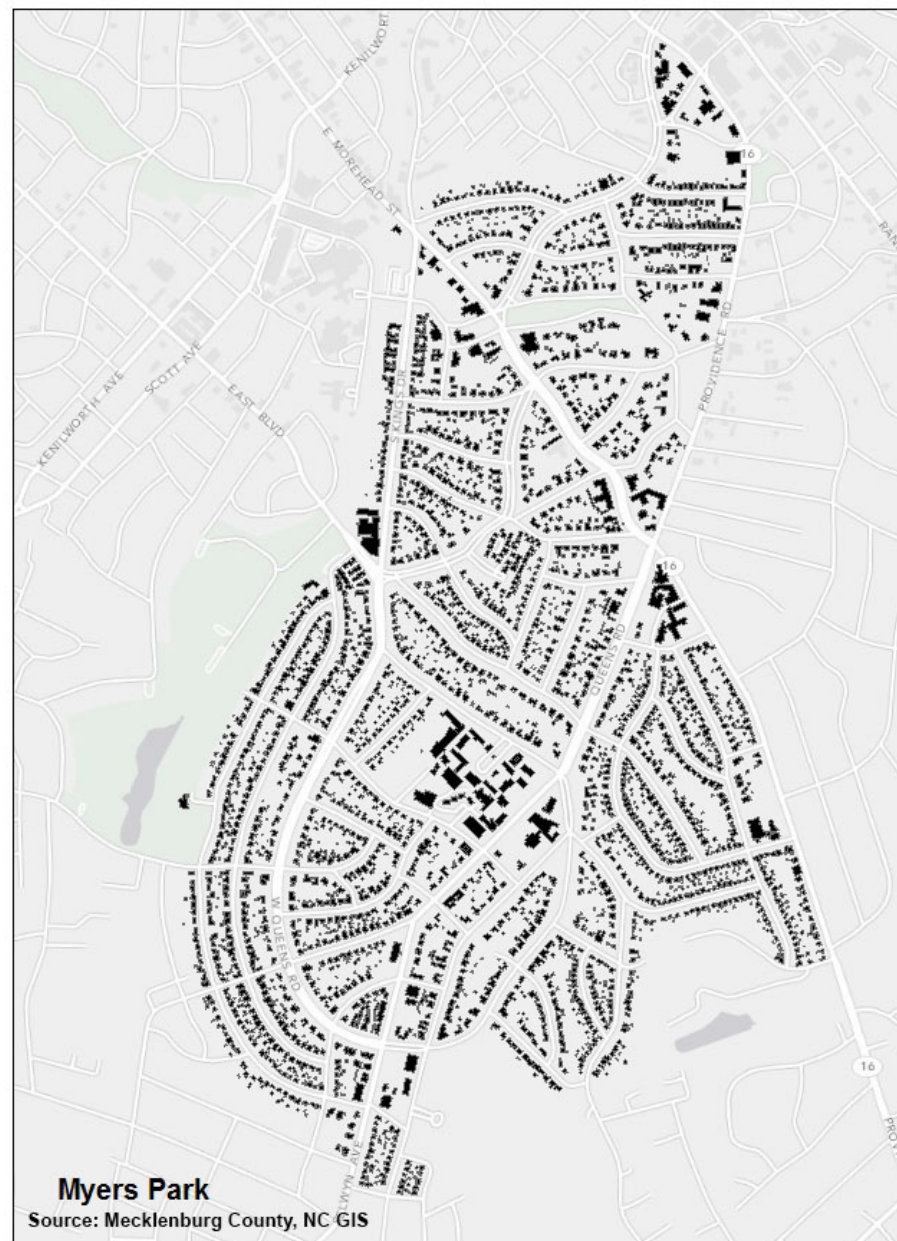


Source: Mecklenburg County, NC GIS

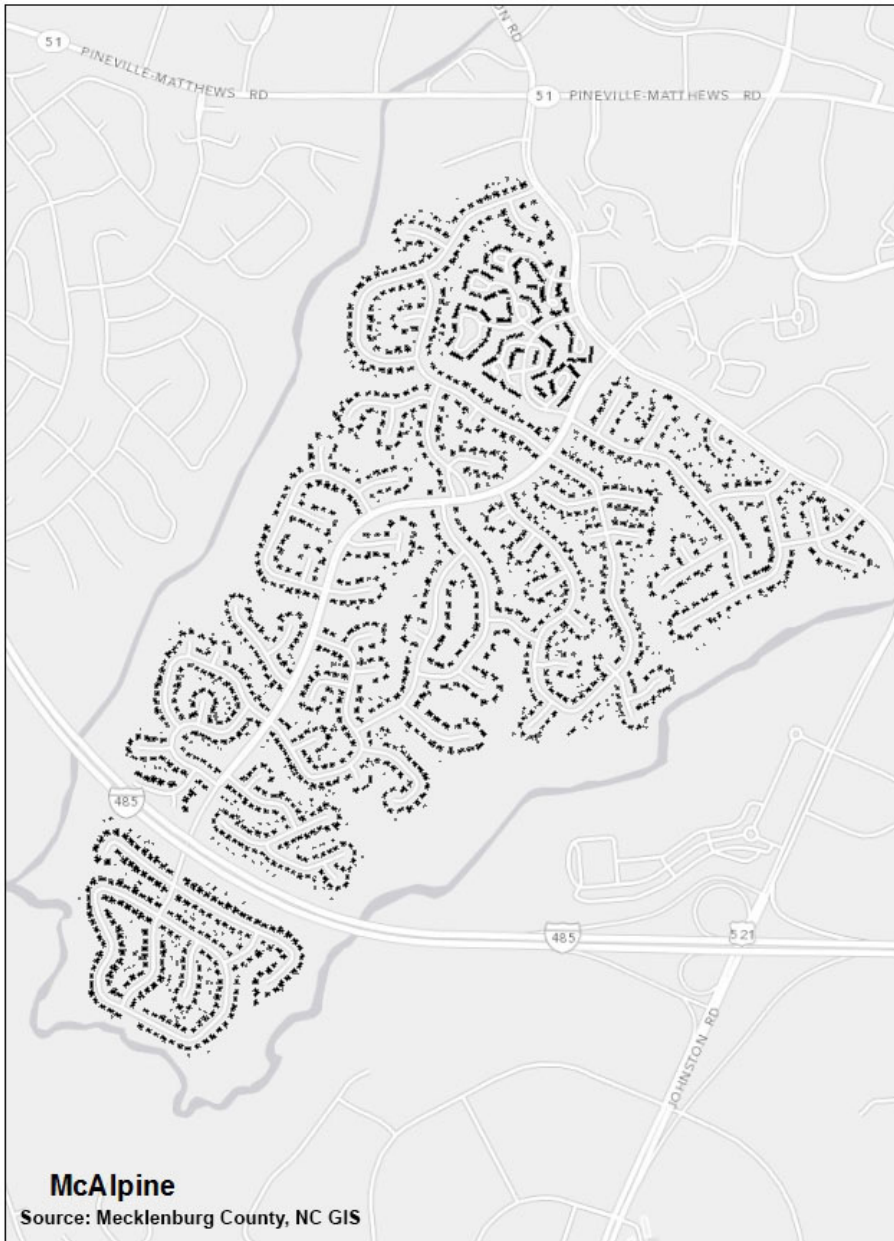
DILWORTH



MYERS PARK



McALPINE



BIRKDALE VILLAGE

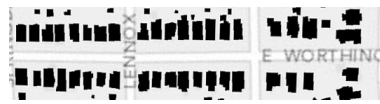


DILWORTH

TIGHT - 85'



MODERATE - 115'

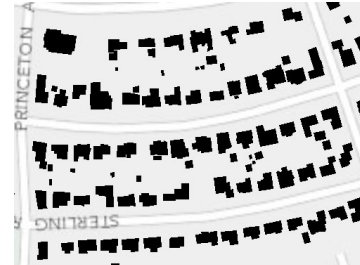


LOOSE - 145'

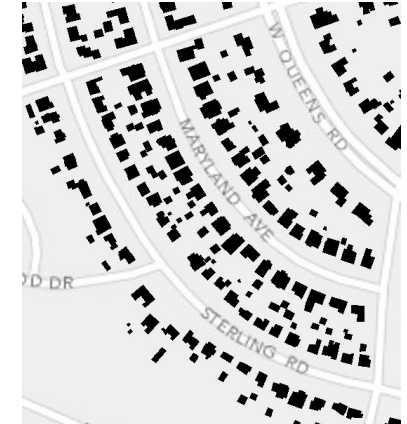


MYERS PARK

TIGHT - 125'



MODERATE - 150'

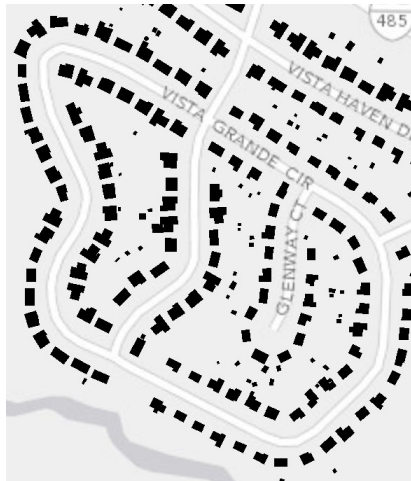


LOOSE - 250'



MCALPINE

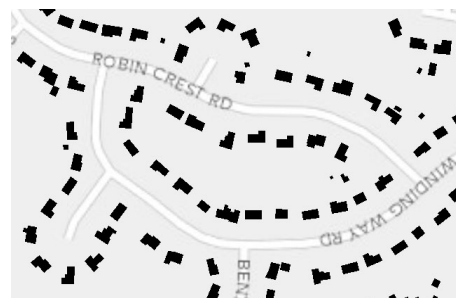
TIGHT - 120'



MODERATE - 145'



LOOSE - 180'



BIRKDALE VILLAGE

TIGHT (TOWN CENTER) - 50'

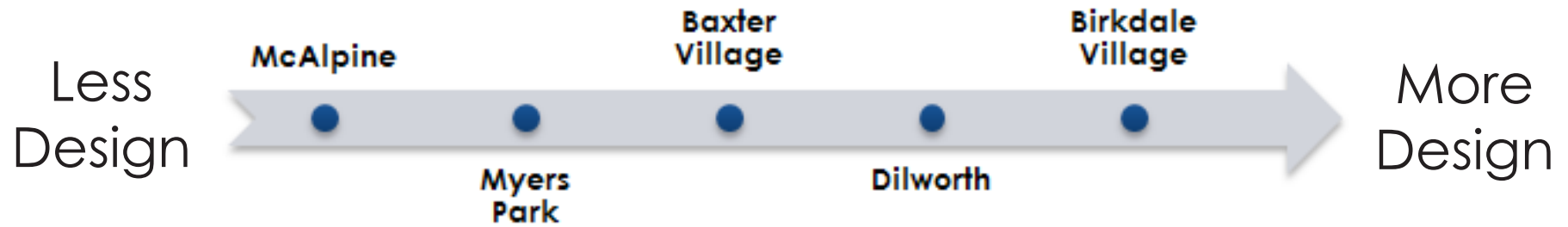


MODERATE - 65'



LOOSE - 100'





BIRKDALE VILLAGE

Although Birkdale Village performs poorly in the design of the private realm, it outperforms every neighborhood in the design of the public realm with top performance in street intersection density, block size, sidewalk width, tree canopy, and enclosure. The streetscape design of this neighborhood is highly walkable.

DILWORTH

Dilworth has overall strong performance across each design element, and outperforms in street connectivity, street diversity, and pedestrian level of service measures. The neighborhood's historic design of narrow, gridded streets lends to its strong performance and inherent walkability.

BAXTER VILLAGE

Baxter Village performs well in the design of both the public and private realms. While the neighborhood has loose street intersection density, it is well connected with diverse, narrow streets. Block sizes are among the smallest of the case studies. Baxter Village also has strong performance in sidewalk width, tree canopy, and enclosure elements. With a similar streetscape to Birkdale Village, this neighborhood is also very walkable.

MYERS PARK

Myers Park performs well in private realm design in the previous chapter, but has mixed performance in the design of the public realm. The neighborhood has relatively large blocks and loose street intersection density, along with loose enclosure. Myers Park is a top performer in street connectivity and diversity, and features many sidewalks and a large tree canopy. These features are important to walkability, but not as much as street intersection density and block size.

MCALPINE

Once again, McAlpine performs poorly compared to the other case studies. McAlpine's street network is loose with moderate connectivity and large blocks. Streets are wide and lack diversity compared to the other case studies. The neighborhood is also consistently last in public realm elements, lacking sidewalks, street trees, and building enclosure.

7

Distance to Transit



Transit is very often the planner's mantra, as it reduces automobile use and traffic congestion, while adding pedestrians to the areas surrounding stations. Planners must consider three factors when making transit decisions: station accessibility, transit headways, and transit fares. The most important factor is transit accessibility.

Research shows that people will walk up to ½ mile to take transit, so pedestrian sheds must be within this radius to build transit demand (United States Green Building Council, 2013). The key is to locate density near transit stations. Density and transit used together create a “virtuous cycle,” where density feeds the transit system with riders, which helps to enhance transit service, that in turn makes transit more attractive to additional riders. The result is a more livable city. (Campoli, 2012).

Transit headways are another important consideration for transit. People especially dislike waiting for transit, which is an unproductive use of their time. They may choose to drive a longer distance that is perceived as a more productive use of their time. For this reason, frequent, reliable service is a must for effective transit.

Potential riders also consider transit fares as compared to driving costs when deciding between transportation modes. Driving costs include fuel expenses, parking fees, and traffic hassles. While fuel expenses are hard

to calculate and may not influence transit decisions often, parking fees are a stronger determinant. Transit fares must be comparable to parking costs to even be considered an attractive alternative to driving. In a nation where free parking is expected, if not demanded, transit service faces an uphill battle to reverse auto-dependence. Traffic hassles may encourage transit use more than any other factor. Transit's dedicated lines that bypass traffic will likely become more attractive as regions grow.

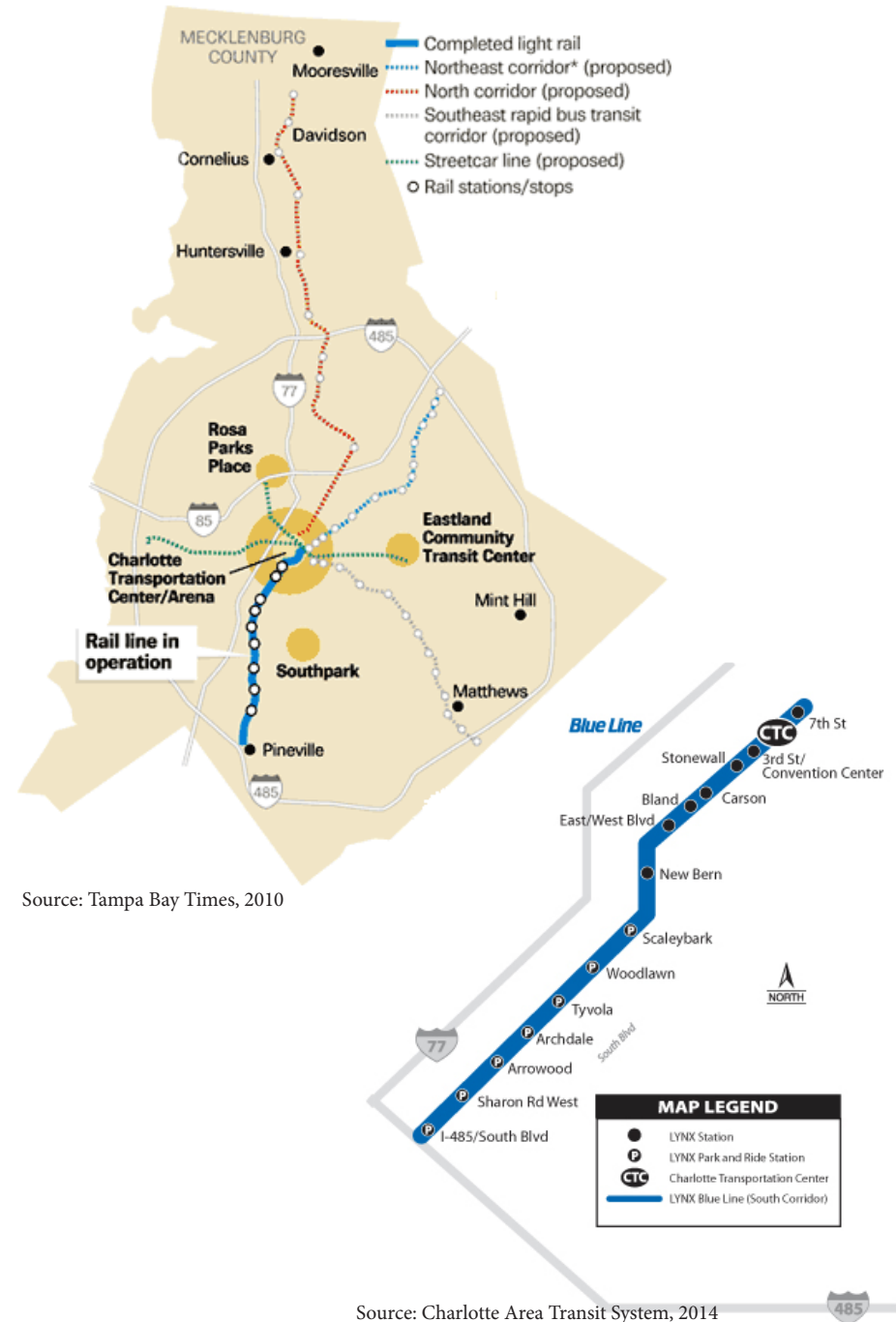
In Charlotte, transit access is provided by a light rail line that serves a limited portion of the city. The following pages will detail transit service in Charlotte by considering transit access, headways, and fares. We will also see which neighborhood case studies are within walking distance to transit, and which are only accessible by the automobile.

LYNX LIGHT RAIL

The LYNX Blue Line is a 9.6-mile light rail line that runs from Uptown Charlotte to I-485 at South Boulevard. There are 15 stations on the line, including seven park and ride stations. The Blue Line is the first of a planned regional transit system. The figures to the right show existing stations along the Blue Line as well as proposed stations on new lines.

As mentioned previously, most people will walk $\frac{1}{4}$ mile to run daily errands, yet are willing to walk up to $\frac{1}{2}$ mile to transit. As seen in the map of Uptown Charlotte, LYNX stations are within $\frac{1}{4}$ mile to most of the city's major destinations. Further south, $\frac{1}{2}$ mile radii are more suitable for a less dense suburban environment.

Dilworth is the only neighborhood case study with transit access. Four stations: Carson, Bland Street, East/West Boulevard, and New Bern, serve Dilworth to some degree. The map on the opposite page depicts transit accessibility to Dilworth within a $\frac{1}{4}$ mile radius in **green**, and a $\frac{1}{2}$ mile radius in **blue**. Residents in the western portion of Dilworth are within a $\frac{1}{2}$ mile radius of a LYNX station, while residents towards the east are beyond walking distance to stations.

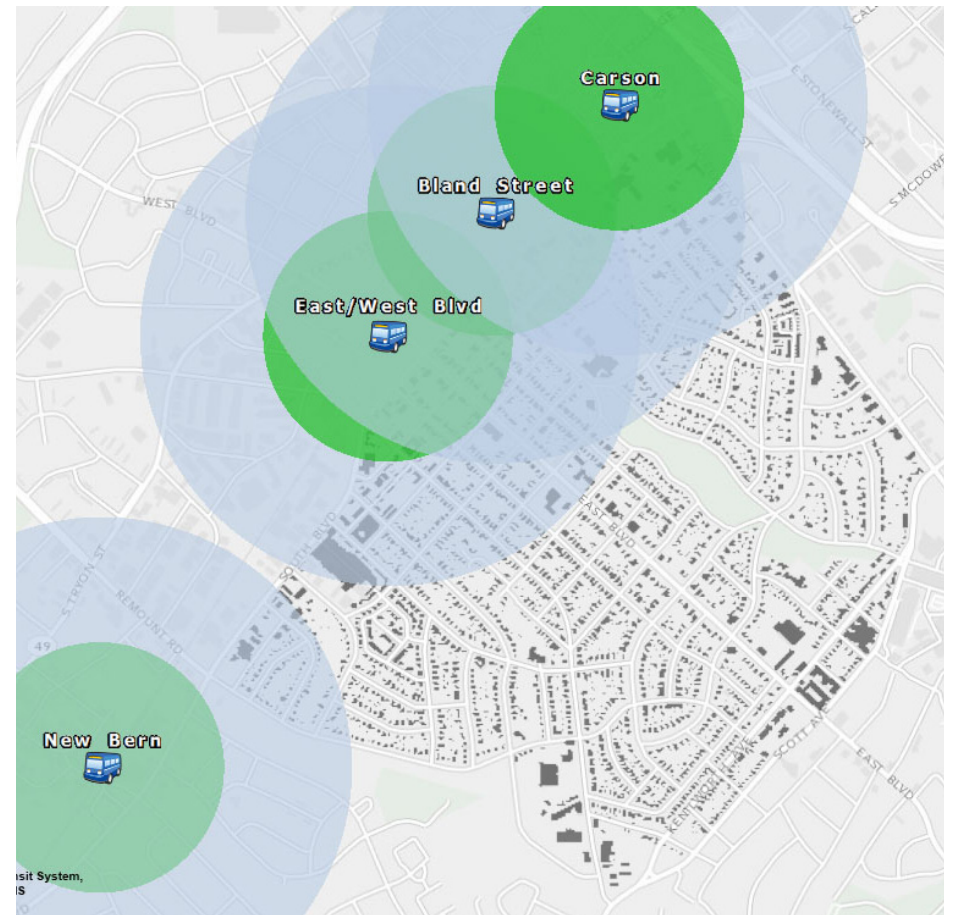


UPTOWN CHARLOTTE STATIONS



Source: Charlotte Center City Partners, 2012

DILWORTH STATIONS



TIME AND MONEY Costs

While transit accessibility is key to ridership, the effective costs of time and money influence decisions to take transit. Riders will compare the time and money expenditures with driving when determining which transportation mode is best. People generally disdain unproductive time waiting for transit, and may rather drive to avoid it. In addition, fares that cost more than parking rates at the destination also deter riders. For these reasons, one must consider transit headways (time between trains) and transit fares for the LYNX Blue Line.

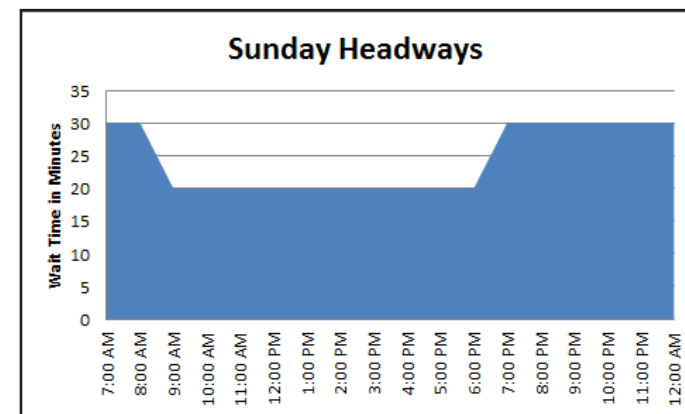
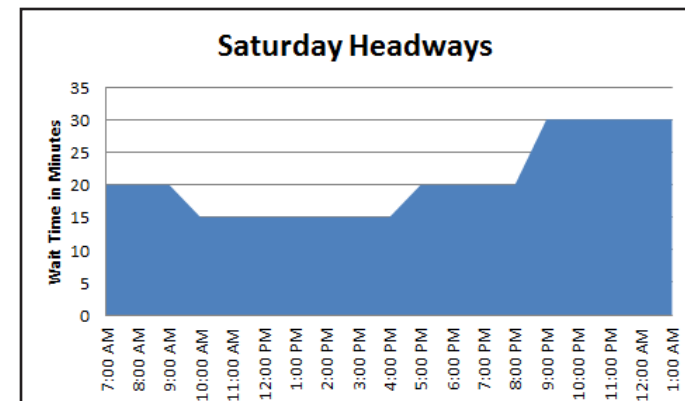
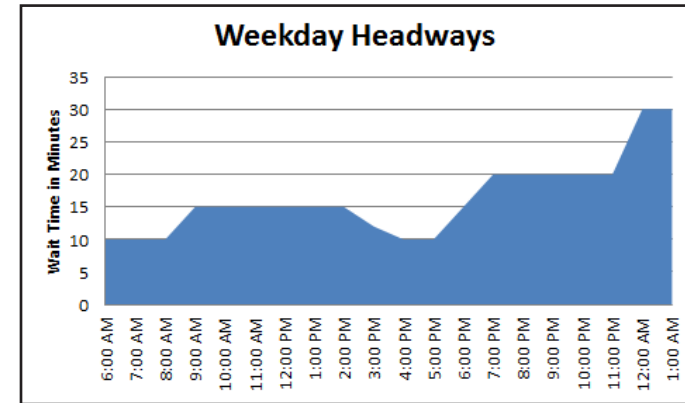
The table below shows transit fares for the LYNX Blue Line as well as parking meter rates in Uptown Charlotte. One-way transit fares are equal to two hours of parking in the city. Transit fares are reasonable, considering the frustration of finding parking during weekdays. Transit is comparatively more expensive on evenings and weekends when street parking is free in Uptown. Free surface parking is the norm outside Uptown, which leads to decisions to drive rather than take transit.

Transit headways, depicted to the right, vary by time of day and day of week. Weekday service has short wait times of 10-20 minutes, while weekends have longer wait times of 15-30 minutes. Combined with free street parking on weekends, driving may be more attractive than transit.

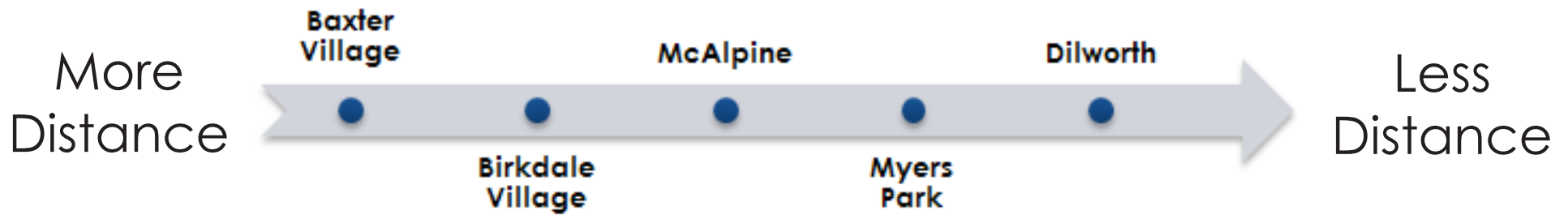
LYNX FARES		UPTOWN PARKING RATES	
REGULAR	\$2.00	WEEKDAYS	\$1.00/hour
STUDENT/SENIOR	\$1.00	EVENINGS/WEEKENDS	Free

Source: Charlotte Area Transit System, 2013

TRANSIT HEADWAYS



Source: Charlotte Area Transit System, December 2013



DILWORTH

Once again, Dilworth is the best performer of the five neighborhood case studies. In this case, Dilworth is the only neighborhood within a comfortable walking distance to the LYNX Blue Line. Although most of the neighborhood is outside the ½ mile walking radius, bicycle access to transit stations would be possible. The other neighborhoods would require a park and ride scenario for transit use.

MYERS PARK

Located just east of Dilworth, Myers Park is within a short drive or bike ride to LYNX stations. Unfortunately, parking availability is limited at these stations and may deter transit use if transferring from auto use. Commutes to Uptown are a short distance from Myers Park, which also would likely encourage driving over transit use.

McALPINE

McAlpine is located within a short drive of the I-485/South Boulevard transit station, which features park and ride service. Bicycle commutes to the station are dangerous and inconvenient. Fortunately, the time costs of traffic congestion in this part of the region may encourage park and ride transit use.

BIRKDALE VILLAGE

At the present time, Birkdale Village is beyond light rail service. Plans for a future line to the north are proposed, but uncertain. Should transit be constructed as proposed, park and ride service would be necessary for Birkdale Village. Since travel distances and traffic congestion are fairly significant, transit use may be more attractive to residents.

BAXTER VILLAGE

Baxter Village is located within Fort Mill, South Carolina, which would require park and ride use at the I-485/South Boulevard station in Charlotte, North Carolina. This station can only be reached by automobile. Since the neighborhood is located in a different jurisdiction than LYNX, future station access is unlikely.

8

Destination Accessibility



Among the “Five D’s,” destination accessibility is the attribute most strongly associated with reducing vehicle miles of travel. Destination accessibility is best described as “how closely a place is located to the destinations to which people travel most regularly.” This attribute can be measured in distance to employment centers, often in the central business district, or in how many jobs or attractions are within specified distances of a location. Neighborhoods located nearby a central business district, such as Uptown Charlotte, often have the highest destination accessibility as concentrated jobs and activities are often in the CBD.

Local accessibility is also an important factor in reducing automobile use. Neighborhoods with strong measures for diversity and density are likely to also have high destination accessibility. Commercial corridors with shops and offices are key to local accessibility to jobs, goods, and services. They also create a live, work, play environment that may increase the demand for density to make the place even more vibrant.

Today, regional destinations are too often auto-centric and lack transit access due to suburban development patterns over the last fifty years. Reversing this trend will require redevelopment of these nodes into dense, mixed-use communities with convenient access to transit. Otherwise, commutes to these destinations will continue via automobile.

In the case study analysis, we will measure the destination accessibility of the five neighborhoods at both local and regional levels. First, we will measure the amount of office and retail space within each neighborhood, considering their previous performance in Neighborhood Completeness (see Chapter 5, Diversity). Second, we will designate regional nodes in the form of shopping centers, office parks, and hospitals. These nodes attract both workers and shoppers. We will use these nodes to determine regional accessibility of the neighborhoods by comparing the distances from each node to the case studies. Finally, we will make conclusions about the overall destination accessibility of the five case studies.

The general public may consider the Walk Score of the neighborhood as a relevant measure of destination accessibility. In reality, the Walk Score has limited accuracy, as it only accounts for distance to destinations regardless of walking conditions or the quality of the destination. Further, homes within large neighborhoods may have vastly different scores due to their proximity to activity nodes. For these reasons, I will refrain from including a Walk Score in this analysis.

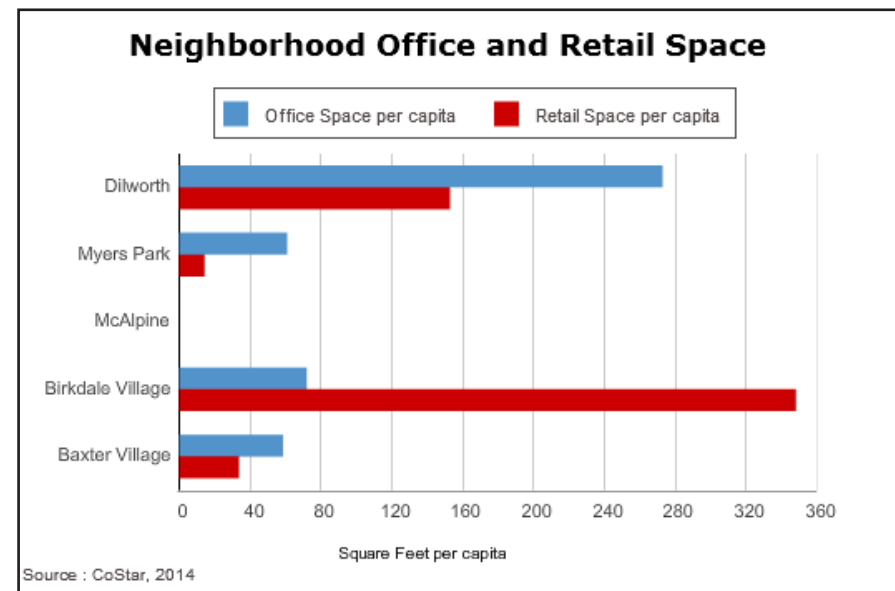
LOCAL NODES

Neighborhood walkability derives from the amount of destinations within the neighborhood and how easily accessible they are to residents. A neighborhood that provides a live, work, play environment features destinations for employment, shopping, dining, entertainment, and recreation. The Neighborhood Completeness Indicator introduced in Chapter 3 measured the amount and concentration of various pedestrian destinations within the case studies. Dilworth was the top performer for this indicator, boasting a high diversity of destinations that serve the community.

The purpose of this section is to identify the amount of office and retail space within each neighborhood, regardless of its particular use. More available space leads to higher employment potential within the neighborhood, meaning a greater chance of living and working in the same community. In addition, greater amounts of retail space increase the attractiveness of walking to destinations to buy goods and services.

The chart to the right compares office and retail space per capita within the five neighborhood case studies. Dilworth has by far the greatest amount office space, with more space per capita than the other four neighborhoods combined. Dilworth's close proximity to Uptown and large residential homes along East Boulevard are suitable for heavy office use. Dilworth also performs well in retail space, but is a distant second to retail-dominated Birkdale Village which has over 350 square feet of retail space per capita. Both Myers Park and Baxter Village have higher amounts of office space than retail space, with Baxter Village being the closest to a balanced amount of each space. McAlpine contains no office or retail space within its boundaries, which is not surprising for a modern residential subdivision.

NEIGHBORHOOD OFFICE AND RETAIL



REGIONAL NODES

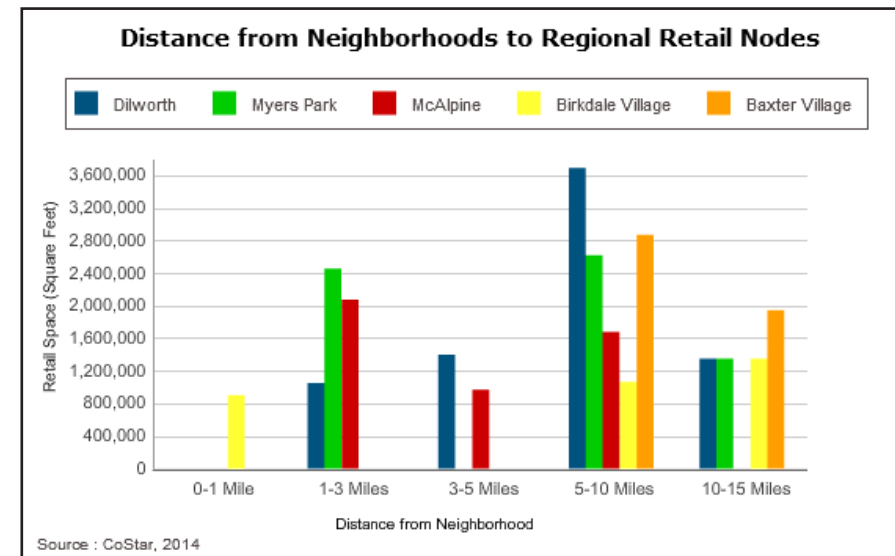
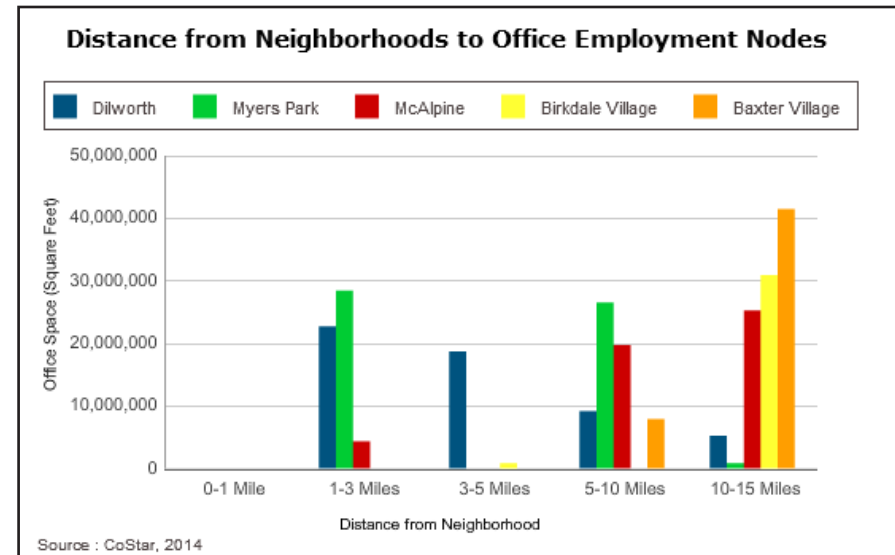
While destination accessibility in neighborhoods is key to walkability, not all land uses are compatible with the neighborhood scale. Such examples are specialty retailers and corporate employers. Well-recognized retail and office destinations are often built at central locations that serve a regional population rather than a local one. Regional development most often comes in the form of office parks, hospital campuses, and regional shopping centers. For these nodes to promote walking over driving, they must be located at a transit stop and have limited or costly parking fees. Otherwise, an auto-centric destination will prevail.

For the case studies, I measured distances from the neighborhoods to regional shopping centers, office parks, and hospitals. I then separated each node into the following categories: 0-1 mile, 1-3 miles, 3-5 miles, 5-10 miles, and 10-15 miles. The figures to the right show the total square footage of regional office and retail space, according to CoStar, within each distance category. Maps showing neighborhoods and regional nodes within each radius category are shown on the next pages.

Dilworth and Myers Park are most accessible to office space in Uptown Charlotte, with access to suburban office parks within 5-10 miles. McAlpine is located at least five miles from substantial office space, while Birkdale Village and Baxter Village are located 10-15 miles away from regional office nodes. All neighborhoods are beyond walking distance to regional office nodes and will require auto or transit use.

Birkdale Village benefits from being a regional retail node, which explains its top performance in retail accessibility. Outside of Birkdale, other retail nodes are at least five miles away. Myers Park and McAlpine also perform well with access to substantial retail nodes within 1-3 miles. Dilworth has access to large retail nodes at varying distances due to its central location. Baxter Village is the weakest performer, with the nearest retail nodes being at least five miles away.

REGIONAL NODE ACCESSIBILITY

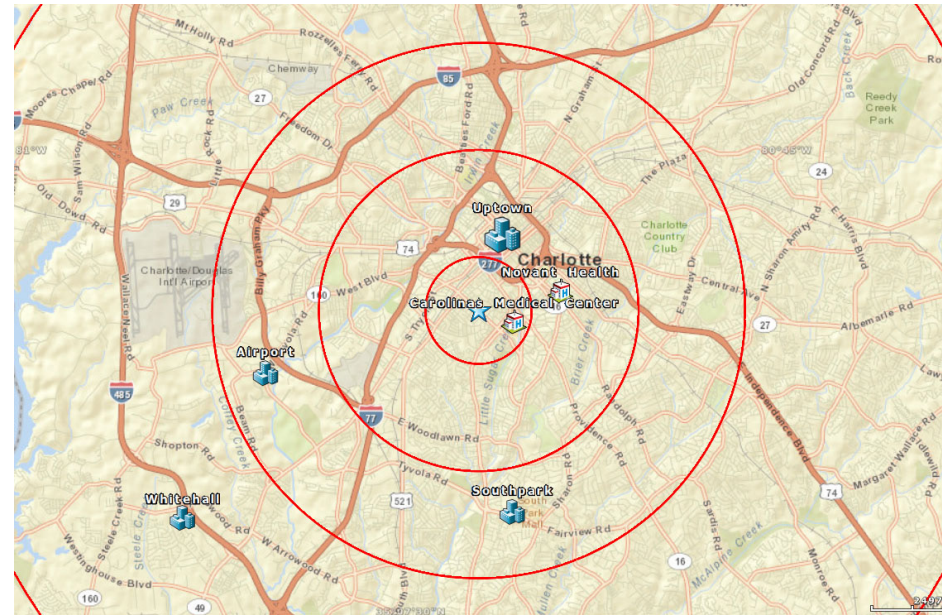


DILWORTH

OFFICE

OFFICE NODE	EXISTING SQUARE FEET
UPTOWN CHARLOTTE	22,751,940
AIRPORT	13,008,152
UNIVERSITY/INNOVATION PARK	8,141,980
SOUTHPARK	5,684,857
BALLANTYNE	4,341,649
ROCK HILL	2,512,014
WHITEHALL CORPORATE PARK	1,053,698
THE PARK-HUNTERSVILLE	879,130

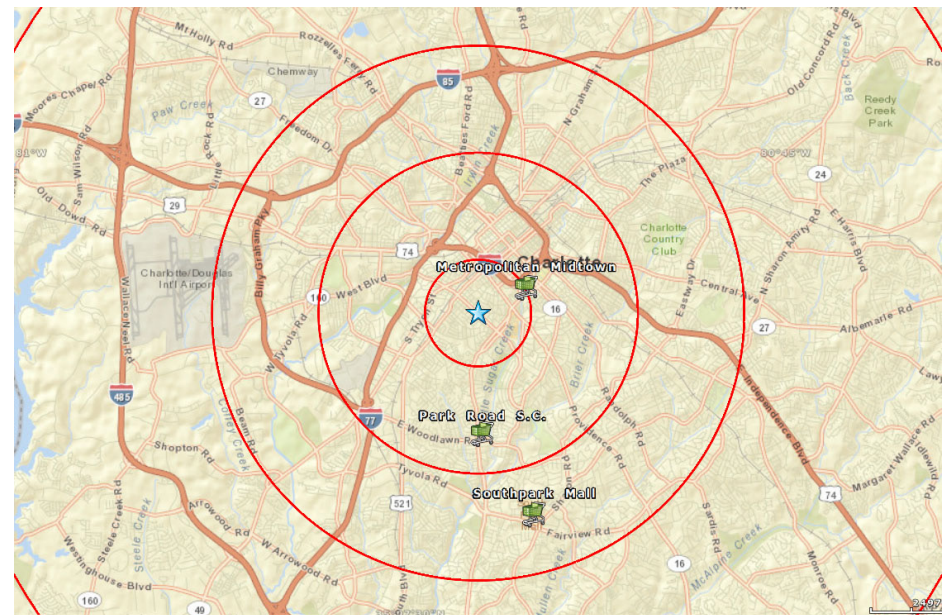
Source: CoStar, 2014



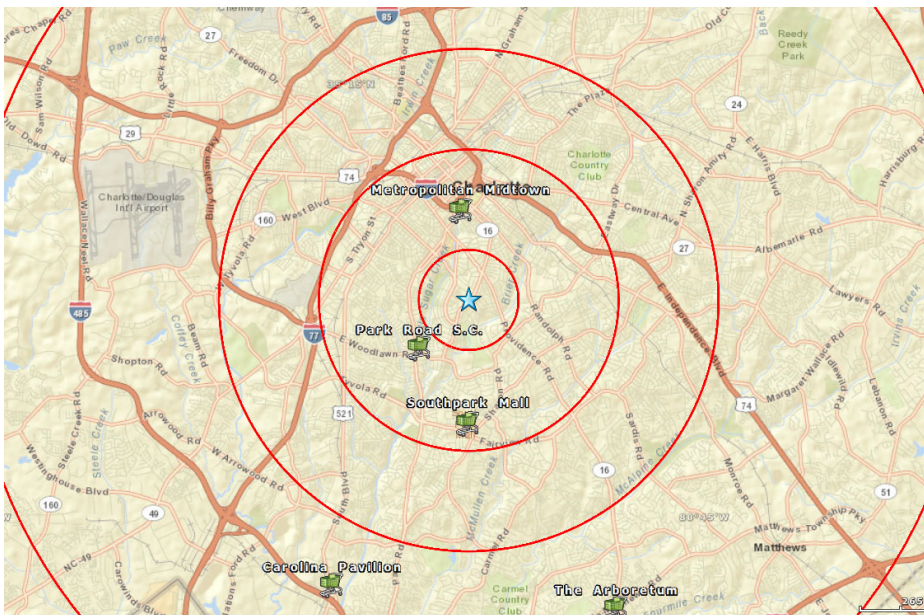
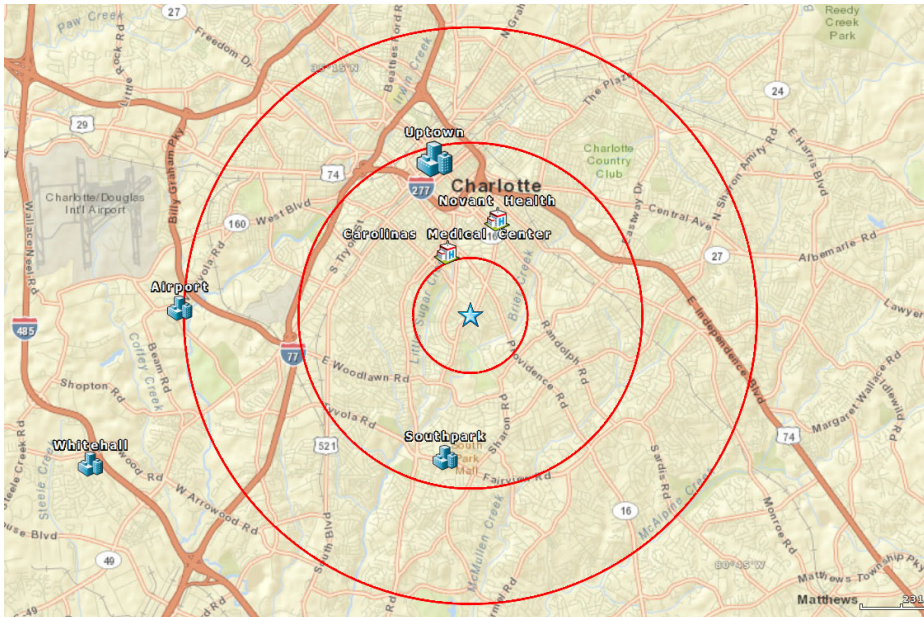
RETAIL

RETAIL NODE	EXISTING SQUARE FEET
SOUTHPARK MALL	1,404,475
CONCORD MILLS	1,353,524
CAROLINA PLACE MALL	1,127,844
NORTHLAKE MALL	1,071,642
CAROLINA PAVILION	952,787
METROPOLITAN MIDTOWN	780,929
THE ARBORETUM	546,710
NORTHCROSS S.C.	513,548
BLAKENEY	427,924
MANCHESTER VILLAGE	367,923
PARK ROAD S.C.	276,494

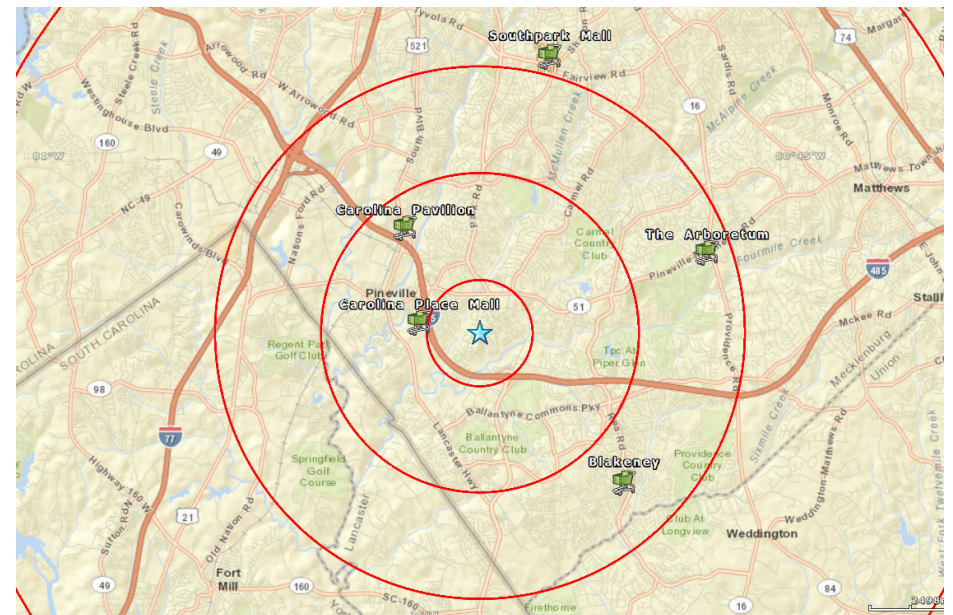
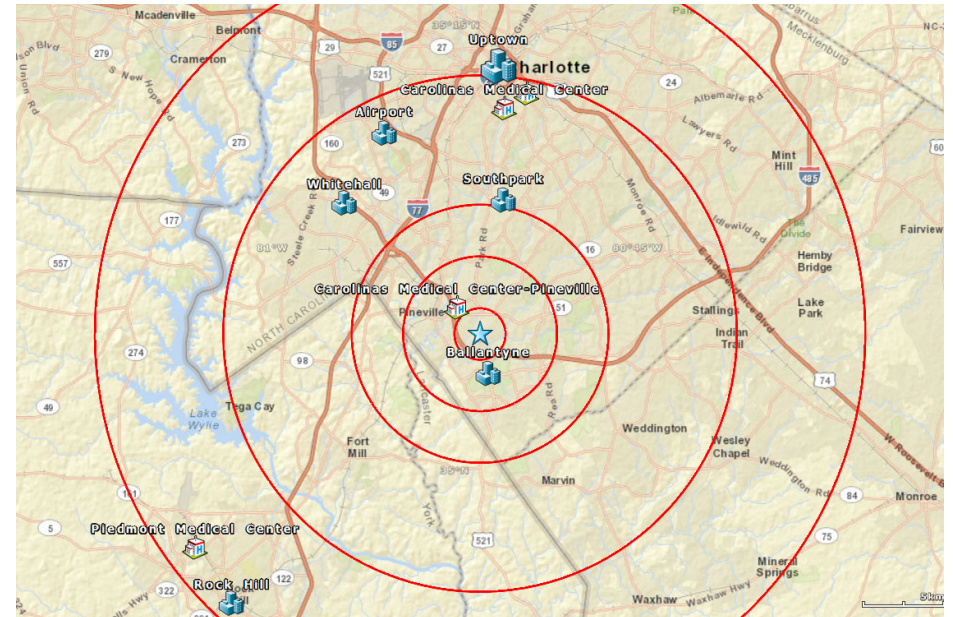
Source: CoStar, 2014



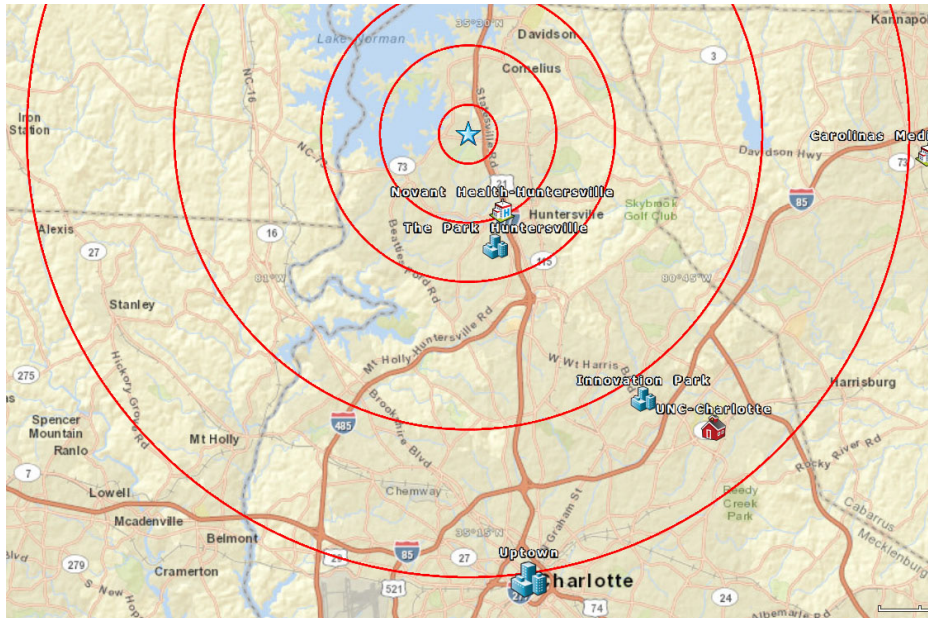
MYERS PARK



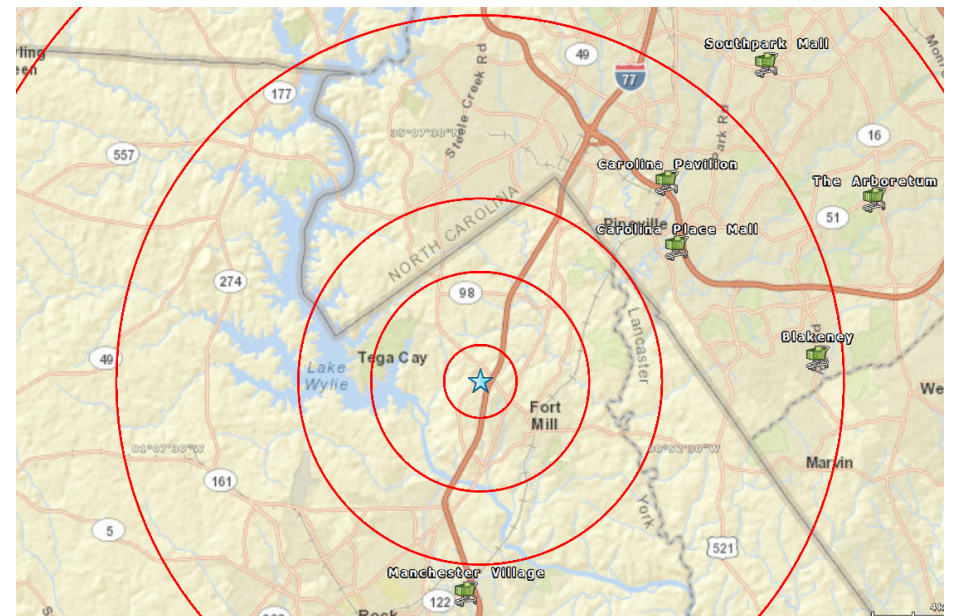
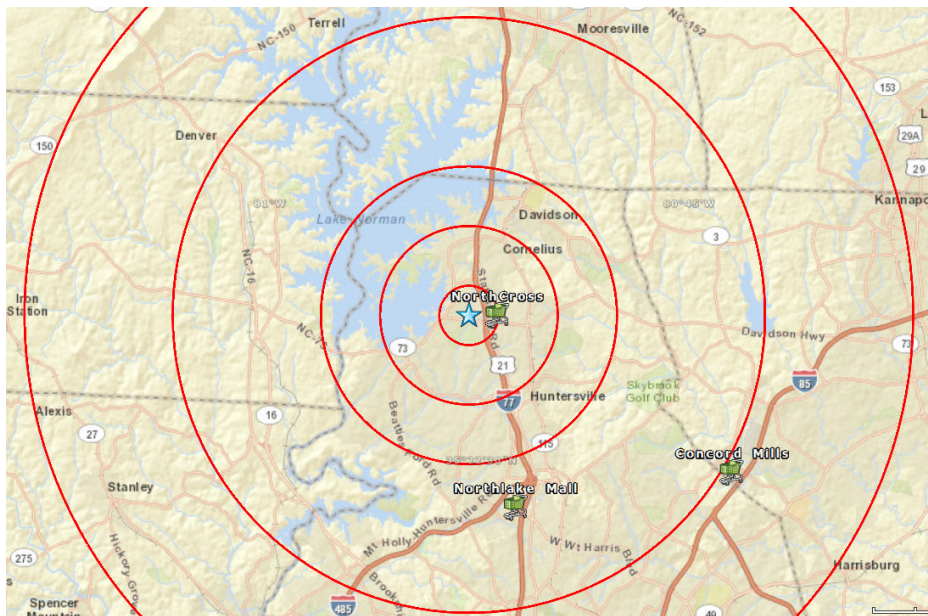
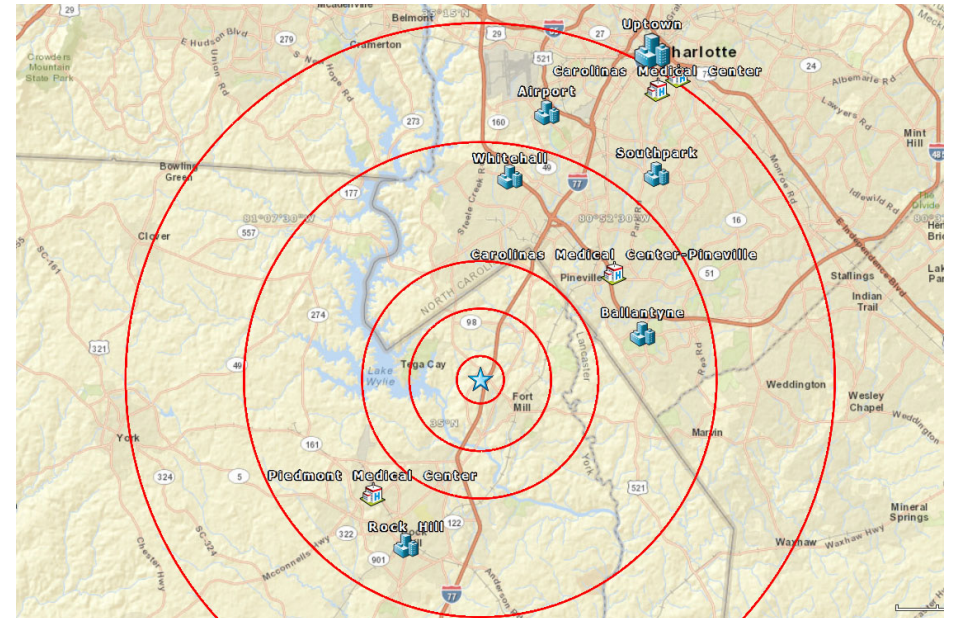
McALPINE

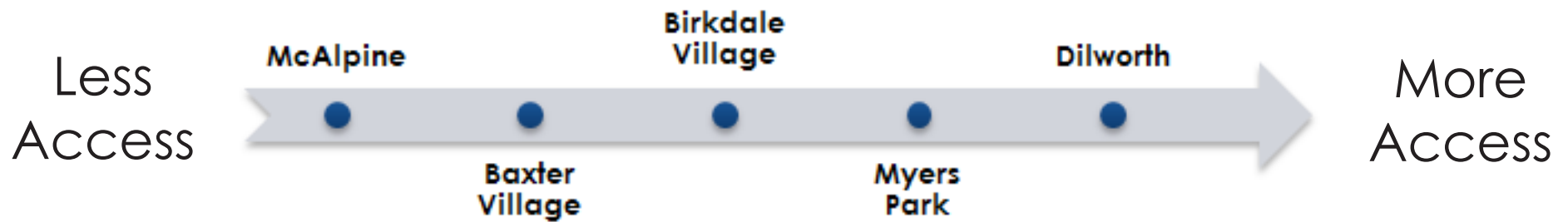


BIRKDALE VILLAGE



BAXTER VILLAGE





DILWORTH

Dilworth performs well across the board in destination accessibility. The neighborhood's local accessibility is the strongest overall, considering that it has the most office space per capita and the second-most retail space per capita. As mentioned earlier, Dilworth outperforms the other neighborhood case studies in the Neighborhood Completeness Indicator, meaning that its destinations are not only accessible, but diverse. The neighborhood's central location to Uptown and the suburbs leads it to a moderate performance in regional accessibility. Most importantly, Dilworth is the only neighborhood that has LYNX Blue Line access to regional nodes nearby transit such as Uptown and the Carolina Pavilion.

MYERS PARK

Myers Park performs relatively well in local accessibility, but has greater strength in regional accessibility. The neighborhood features moderate amounts of office space per capita; however, its amount of retail space is relatively low. Myers Park has a central location that has easy access to Uptown, hospitals, and SouthPark Mall, leading to its top performance in regional accessibility.

BIRKDALE VILLAGE

Birkdale Village's high concentration of retail space leads it to a moderate performance in destination accessibility. The neighborhood has the most retail space per capita of all five case studies, and is second to Dilworth in office space per capita. Birkdale Village has mixed results in regional accessibility, performing well for retail nodes, but poorly for office nodes. Also of concern, distance gaps exist in retail nodes from 1-5 miles and in office nodes from 3-10 miles.

BAXTER VILLAGE

Baxter Village performs moderately well in local destination accessibility, but performs poorly in regional destination accessibility. The neighborhood has moderate amounts of both office and retail space per capita, with office space being in line with Myers Park and Birkdale Village and retail space per capita being somewhat higher than Myers Park. Regional performance is weak; however, as residents must travel at least five miles to reach both retail and office nodes. Unfortunately, transit access does not exist in Baxter Village, so driving is the only option to reach these nodes.

MCALPINE

McAlpine is the least accessible neighborhood of the case studies, featuring no office or retail space within the community. Regional office nodes are small until a 5-mile radius is reached, resulting in daily commutes to work and traffic congestion. McAlpine performs well in regional retail accessibility due to its suburban location near Carolina Place Mall and the Carolina Pavilion. Unfortunately, the neighborhood's lack of transit access makes these nodes accessible only by automobile.

PART 4

CONCLUSIONS

9. FINDINGS AND CONCLUSIONS

9

Findings and Conclusions



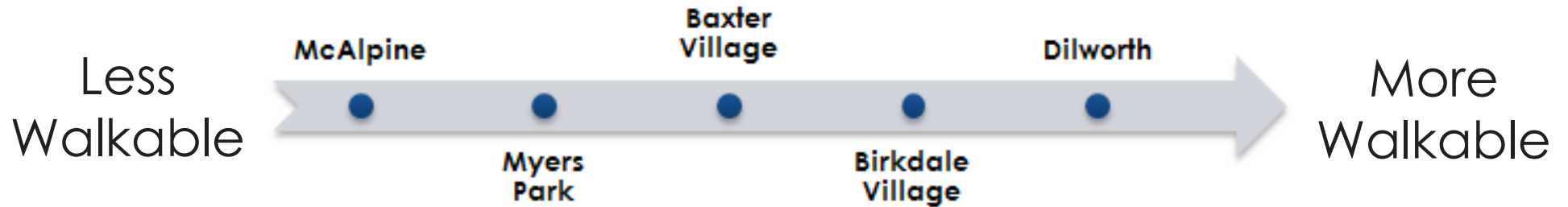
All five attributes of the built environment: diversity, density, design, distance to transit, and destination accessibility work together to create a walkable environment for pedestrians. While some attributes are less likely to encourage walking than others, they remain a valuable asset to the success of stronger attributes.

In this chapter, we will bring together the performance results of the five case studies from the “Five D’s” in the previous chapters to determine the most walkable neighborhoods. First, we will review previous neighborhood performance, and consider the value of each attribute to walkability. Second, we will break down the case studies by neighborhood development eras to see what similarities exist in each category and compare the differences among categories. Next, we will make conclusions about the existence of walkability attributes among neighborhood development eras and discuss the implications of such conclusions. Finally, we will discuss potential next steps for future research that could contribute to today’s findings.

The figures on the following page review neighborhood performance across the five walking attributes of the built environment. The rank of each neighborhood for each attribute from the previous chapters is shown in the first table. The second table shows the relationship between each attribute and its elasticity of walking, based on a compilation of previous studies. Neighborhoods receive a final ranking in regards to overall walkability considering their rank for each attribute along with the weight of each attribute on walking. The final rankings are depicted in the top figure on the next page, but are also shown below.

FIRST PLACE: DILWORTH
SECOND PLACE: BIRKDALE VILLAGE
THIRD PLACE: BAXTER VILLAGE
FOURTH PLACE: MYERS PARK
FIFTH PLACE: MCALPINE

NEIGHBORHOOD CASE STUDY FINDINGS



NEIGHBORHOOD WALKABILITY RANKINGS

NEIGHBORHOOD	DIVERSITY	DENSITY	DESIGN: LAND USE AND BUILDINGS	DESIGN: STREETS AND ENCLOSURE	DISTANCE TO TRANSIT	DESTINATION ACCESSIBILITY
DILWORTH	1	1	1	2	1	1
MYERS PARK	4	3	2	4	2	2
McALPINE	5	5	5	5	3	5
BIRKDALE VILLAGE	2	2	4	1	4	3
BAXTER VILLAGE	3	4	3	3	5	4

RELATIONSHIP OF ATTRIBUTES TO WALKING

WALKABILITY ELEMENT	VARIABLE	TOTAL STUDIES	WEIGHTED AVERAGE ELASTICITY OF WALKING
DENSITY	Household / Population	10	0.07
	Job Density	6	0.04
DIVERSITY	Land Use Mix	8	0.15
	Jobs-Housing Balance	4	0.19
	Distance to a store	5	0.25
DESIGN	Street Intersection Density	7	0.39
DESTINATION ACCESSIBILITY	Job within 1-mile	3	0.15
DISTANCE TO TRANSIT	Distance to transit stop	3	0.15

Source: Ewing and Cervero, 2010

STREETCAR SUBURBS

DILWORTH

Charlotte's first streetcar suburb, Dilworth, is the most walkable of the five neighborhood case studies. The neighborhood ranks first in every attribute that affects walkability, except for the design attribute of streets and spatial enclosure. Even in this attribute, Dilworth performs very well; however, Birkdale Village's performance is exceptional. Dilworth's primary benefits as a streetcar suburb include a central location with easy access to Uptown and other regional destinations; a dense street network made of small blocks; a neighborhood unit structure that supports diversity; and building setbacks and architecture that was designed at the human scale.

Incremental change over time has also benefited Dilworth through increasing densities with infill development and converting stately residences to office uses that increase job accessibility. In recent years, near-by light rail access has also enhanced walkability and the desirability of the neighborhood. Despite its age, Dilworth serves as a walkable model for today's neighborhood development.

MYERS PARK

Charlotte's wealthy streetcar suburb, Myers Park, is not nearly as walkable as its counterpart, Dilworth. As a result, Myers Park is the fourth most walkable of the case studies. The neighborhood's performance is mixed in the attributes that most affect walking: design and diversity. Unlike Dilworth, Myers Park has relatively large blocks; a loose street network; and a limited variety of land uses and housing types. The single-family dominance of the neighborhood also results in low housing and population density measures.

Like Dilworth, Myers Park has a central location with easy access to Uptown and other regional destinations. Myers Park remains an attractive neighborhood today due to an aesthetically pleasing landscape with high architectural diversity. The neighborhood is transit accessible for those with a bicycle or automobile. Overall, Myers Park is more walkable than a conventional suburb, but lacks many of the attributes that encourage walking, which are featured in the traditional neighborhood development case studies.

TRADITIONAL NEIGHBORHOOD DEVELOPMENTS

BIRKDALE VILLAGE

Huntersville's popular traditional neighborhood development, Birkdale Village, is the second most walkable of the case studies. The neighborhood outperforms Dilworth for top place in the most critical measure to encourage walkability: street intersection density. Birkdale Village has a tight street network with small blocks that are well-enclosed by trees and buildings. The neighborhood is constructed with moderate densities to support a diverse set of land uses. Birkdale's streetscapes are well-designed with narrow streets, adequate sidewalks, and various pedestrian elements.

Birkdale Village struggles in a few walkability measures, primarily due to its suburban location and relatively small size. The neighborhood lacks civic facilities such as a school, library, or church. It also is far beyond light rail access, and requires substantial driving to reach employment nodes. Future development of office or civic uses on existing parking lots could improve these conditions. Despite these challenges, the neighborhood is highly walkable within its boundaries and boasts the most effective attributes that increase walking.

BAXTER VILLAGE

Fort Mill's popular traditional neighborhood development, Baxter Village, is the third most walkable of the neighborhood case studies. The neighborhood performs moderately well in the important design and diversity measures, with weaker performance in the other walkability attributes. Baxter is somewhat more suburban in nature than Birkdale Village, resulting in a less walkable environment than its counterpart. Such elements include lower densities and a less diverse housing mix than Birkdale Village. The neighborhood shares Birkdale Village's challenges in part to a suburban fringe location that is also distant from transit and other regional destinations.

Despite these challenges, the neighborhood has well-designed streets and buildings that create an interesting, safe, and inviting environment for pedestrians. The community boasts a unique town center, a multitude of pocket parks, and various civic centers. While the neighborhood is pedestrian-friendly within its boundaries, it lacks a central location that would further limit the need for the automobile.

CONVENTIONAL SUBURBS

McALPINE

South Charlotte's affluent suburban subdivision, McAlpine, lacks most of the attributes of walkability and is the least walkable of the case studies. This neighborhood was clearly designed with the automobile in mind, and presents a stark contrast to the other four pedestrian-oriented case studies. McAlpine is a residential subdivision of primarily single family homes that are accessed by automobile-oriented garages. All commercial and civic uses are separated away from the neighborhood along arterials, which are accessed primarily by the automobile. Homes in the subdivision are set away from the street and feature little architectural diversity. Sidewalks and other pedestrian affordances do not exist in McAlpine. Park space and amenities are also minimal and located only along the greenway perimeter.

McAlpine's best performance is in distance to transit, which is still weak. The neighborhood's short distance to a park and ride light rail station puts it ahead of traditional neighborhood developments located along Charlotte's suburban fringe, yet an automobile remains necessary to access transit. McAlpine represents post-WWII suburban development that lacks nearly all the attributes that promote walking. Auto-orientation is inherent in the neighborhood's design, and presents many of the problems discussed in the introduction section of this study.

CONCLUSIONS

Based on my research in Charlotte, I conclude that streetcar suburbs are often more walkable than traditional neighborhood developments. While both neighborhood types perform similarly in diversity, density, and design measures, the streetcar suburbs most often have a superior location near the center city, as compared to more suburban locations of traditional neighborhood developments. This central location leads to consistently higher performance in measures of destination accessibility and distance to transit. Location appears to be the prime weakness of the traditional neighborhood developments, while it is the prime strength of the streetcar suburb case studies. A detailed comparison of streetcar suburbs to traditional neighborhood development case studies follows.

STREETCAR SUBURBS

The streetcar suburbs and traditional neighborhood developments have similar metrics for diversity and density. These neighborhoods are relatively complete, meaning a variety of necessary destinations exist within their bounds, such as schools, churches, or a supermarket. This compares to a conventional suburb that features only residential uses and perhaps some recreation or open space. Streetcar suburbs and traditional neighborhood developments also tend to have greater population and housing densities than the low-lying single family suburban subdivision. Greater densities are often the result of small lots, infill development, and mixed-use development that exist in these communities. I also believe that diversity and density will increase in the streetcar suburbs as infill development occurs on well-located parcels.

The streetcar suburbs perform better in the design of the private realm (land use and buildings) than in the public realm (streets). Park, schools, and civic uses are more often located in the neighborhood than in traditional neighborhood developments. In addition, these land uses are placed in more central locations, and designed to be more pedestrian friendly. They feature convenient sidewalk access with parking being located on-street or to the rear of the property, rather than in a large parking lot that faces the street. Architectural diversity varies by neighborhood; however, streetcar suburbs tend to be inherently more diverse due to vernacular styles combined with incremental changes over time. They are also built at a human scale, which reflects development prior to automobile dominance. Traditional neighborhood developments must be careful to avoid the homogeneity and auto-centricity that is found in the design of the conventional suburb.

TRADITIONAL NEIGHBORHOOD DEVELOPMENTS

Traditional neighborhood developments perform better in the public realm (streets), than in the private realm (land use and buildings). These neighborhoods have very tight street networks with high intersection density and connectivity. Blocks are often smaller than the streetcar suburbs, and offer a variety of paths for pedestrians. New Urbanism is a major proponent of a walkable streetscape, that includes sidewalks, street trees, and pedestrian elements. Many of these features are common in

streetcar suburbs, but not as to the degree of traditional neighborhood developments. Street enclosure is also a strength of this neighborhood type, as setbacks are tighter than the streetcar suburbs, and street trees are placed more frequently to create the feeling of an outdoor room. Many of these elements cannot be found in a conventional suburb.

Distance to transit and destination accessibility are factors of both neighborhood completeness and location. As mentioned before, both streetcar suburbs and traditional neighborhood developments are relatively complete with many popular destinations within their bounds. Each neighborhood's location in the region is also important to accessing regional retail and employment nodes, as well as transit. Streetcar suburbs benefit from a central location that is inherent in older neighborhoods. Such a location has greater accessibility to the center city and is more likely to be on a transit line than suburban locations. Traditional neighborhood developments that are created on greenfield sites are more likely to be in suburban locations, which are at a disadvantage to more accessible inner-ring neighborhoods. While walkability within neighborhood boundaries is important, accessibility to regional employment and retail nodes has been found as a critical factor to reducing vehicle miles of travel, which results in more walking.

SUMMARY

To summarize, streetcar suburbs tend to be more walkable than traditional neighborhood developments. They are often centrally located to the central city, whereas TNDs are often located in more suburban locations. While diversity, density, and design elements can be replicated from streetcar suburbs, neighborhood placement is a product of geography and the land market. Regardless of location, both of these neighborhood types have far superior walkability to conventional suburbs, which fail to include features that pedestrians expect for a safe and comfortable journey through the neighborhood.

IMPLICATIONS

Based on my study of five neighborhoods developed during different time periods in the Charlotte region, I have found that streetcar suburbs and traditional neighborhood developments share many strengths of the five walking attributes: Diversity, Density, Design, Distance to Transit, and Destination Accessibility. The major differences between these neighborhood types exist as a product of their location, whether in an inner-ring or outer-ring suburb of the city.

My findings support New Urbanist claims that the movement is reviving neighborhood development principles that were prominent prior to World War II and the inception of the conventional suburb. The TND communities feature similar land use, building, and streetscape designs to those of the streetcar suburbs. They also return civic and commercial uses to neighborhood centers, a practice that has been neglected since World War II. Finally, traditional neighborhood developments promote dense built environments with mixed-use structures, which have been outlawed by conventional zoning for decades. Unfortunately, the availability of large land tracts for development are often located in suburban locations. The result is a pedestrian-friendly neighborhood within an auto-centric surrounding environment.

Planners who wish to promote walkable environments should consider the neighborhood unit and the implementation of the “Five D’s” into development standards. Revision of zoning codes to allow for mixed-use projects at higher densities may be necessary, along with educating the public about the benefits of such changes. Municipalities may also want to streamline their approval process for walkable projects, such as TNDs and transit-oriented developments. The continuing development of conventional suburbs that lack walkability attributes will only exacerbate problems associated with our nation’s auto-dependence.

FUTURE RESEARCH

The results of this study begs the question, “Are people walking in these neighborhoods?” The answer to this question is beyond my research, and would require professional services to accurately measure walking activity within the neighborhood case studies. This study describes the existence of neighborhood attributes that encourage walking, concluding that walkability is directly related to the existence of these attributes. Further analysis to compare the relationship between actual walking activity and the existence of these elements would be an interesting follow-up to this study.

The application of methods used in this study to other neighborhoods would provide valuable insight into differences among streetcar suburbs, conventional suburbs, and traditional neighborhood developments across the country. Such research may uncover national trends in the relationship among neighborhood development eras and walkability. Furthermore, the application of my techniques to neighborhoods built during other time periods, such as colonial settlements in Savannah or Charleston, may introduce a new level of walkability, likely greater than more recently created streetcar suburbs.

The methods employed in this study are easily replicated through detailed observation and the use of technology. They can be applied to any neighborhood across the country, and modified to meet certain goals. Further research will only benefit the community through more learning about pedestrian-friendly environments.

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PAGE 5, A PLANNING FAILURE

1. Top: Las Vegas Suburban Sprawl. Retrieved from <http://guidoanselmi.deviantart.com/art/Las-Vegas-Suburban-Sprawl-V-172257866>
2. Middle: Study: Atlanta Traffic. Retrieved from <http://www.wsbradio.com/news/news/study-atlanta-traffic-7th-worst-nation/nWF7c/>
3. Bottom Left: Strongsville's Southpark Mall. Retrieved from <http://www.multihousingnews.com/cities/cleveland/westfield-group-to-sell-strongsvilles-southpark-mall/1004068880.html>
4. Bottom Right: No Sidewalk. Retrieved from <http://www.katu.com/politics/local/Mayor-looks-to-outside-money-for-sidewalk-improvements-200346001.html>

PAGE 11, NEIGHBORHOOD MODELS

1. Model Highland Park. Retrieved from http://www.flickr.com/photos/z_b_p/2804454893/in/photostream/

PAGE 16, TRADITIONAL NEIGHBORHOOD DEVELOPMENT

1. Top: Celebration Aerial. Retrieved from <http://frontgatere.com/>
2. Middle: Celebration Town Center. Retrieved from <http://cdn1.media.zp-cdn.com/9467/Celebration-0e0926.jpg>
3. Bottom Left: Celebration Park. Retrieved from <http://www.pamspremiumproperties.com/Web/AR302728/CustomContent/index/5040551>
4. Water Street. Retrieved from <http://celebrationhomesales.com/celebration-condos.htm>

PAGE 84, LYNX LIGHT RAIL

1. Bottom Right: Lynx Train. Retrieved from <http://villaheightsvoice.com/stories/244>

